TECHNOLOGY DEPT.

Gas Journal

LIGHT - HEAT - POWER - BY-PRODUCTS

Vol. 246. 97th Year. LONDON, DECEMBER 5, 1945. Registered as a Newspaper. No. 4302. Price 1/-

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DETROIT

GAS DRYING PLANTS by HOLMES

FOUNDED 1850 HOLMES HUDDERSFIELD

Prevent Corrosion of Gas Mains, Services and Meters

Eliminate water-logged and frozen services

Save pumping of syphons on the district

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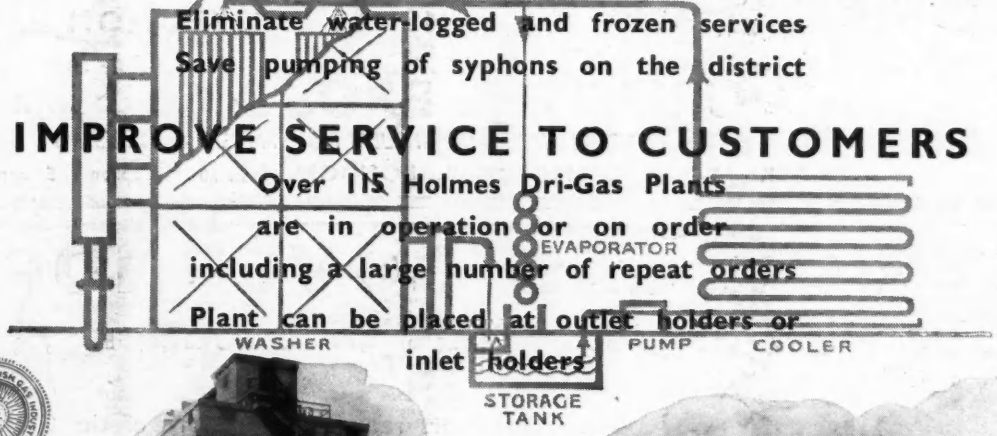

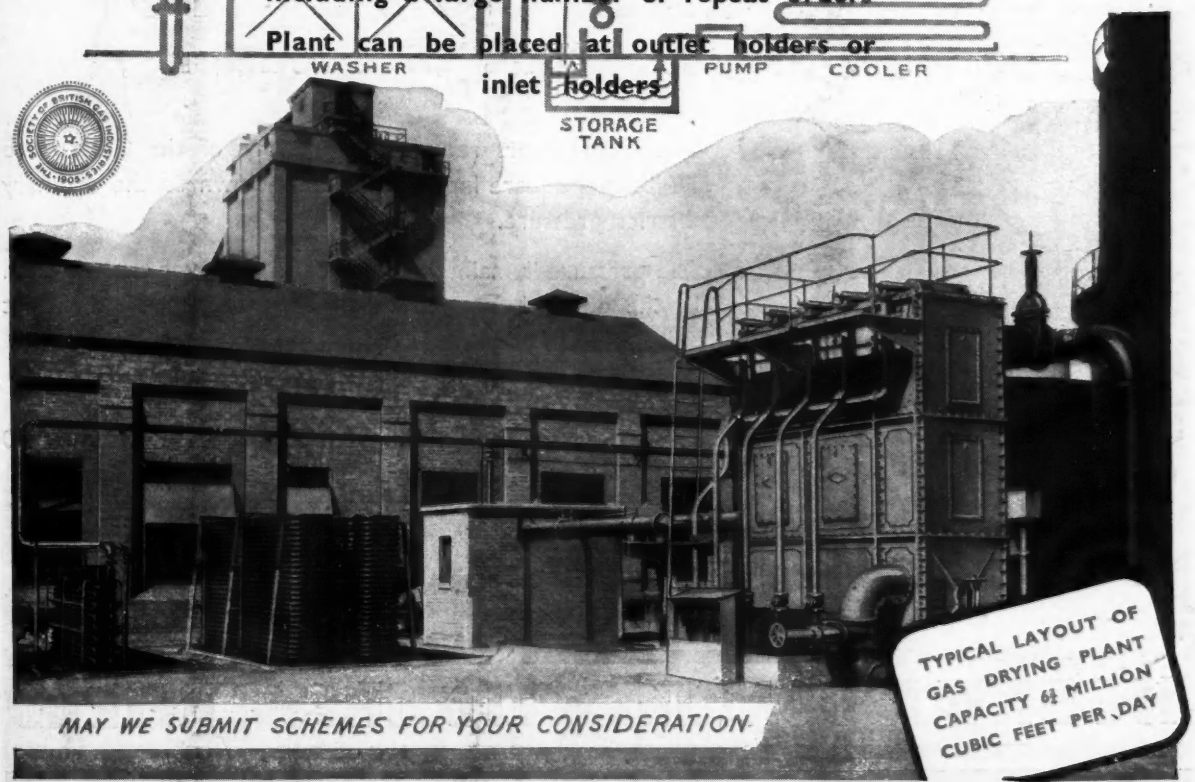

TYPICAL LAYOUT OF GAS DRYING PLANT CAPACITY 6½ MILLION CUBIC FEET PER DAY

MAY WE SUBMIT SCHEMES FOR YOUR CONSIDERATION

W. C. HOLMES & CO. LTD. · TURNBRIDGE · HUDDERSFIELD

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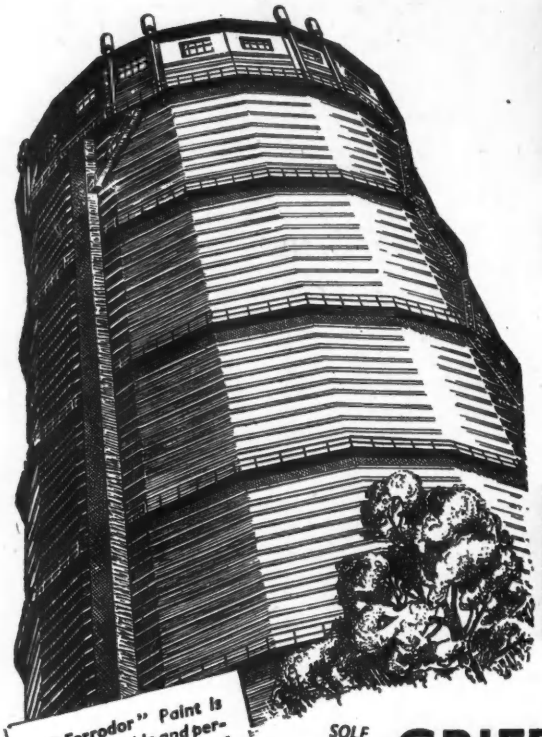

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Owing to its exceptional rust-inhibiting properties, "Ferrodor" Metal Protection affords great economy in labour and reduces maintenance costs to the minimum

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METAL PROTECTION

"Ferrodor" Paint is still available and permitted for essential maintenance work

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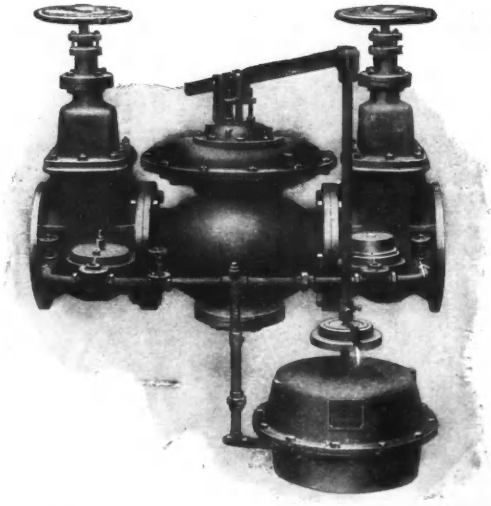
DISTRICT GAS GOVERNORS

For High Pressure Gas Distribution



These Governors reduce the pressure of the Gas (up to 50 lbs. per square inch) at the inlet down to the ordinary district pressure.

The pressure is maintained constant whatever the variation in the demand for gas and in the pressure on the inlet side.

Absolute certainty of action under all conditions.

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GOVERNORS SUPPLIED TO SUIT EVERY POSSIBLE CONDITION

THE BRYAN DONKIN CO. LTD., CHESTERFIELD

GAS JOURNAL, DEC. 5, 1945
VOL. 246 97th YEAR No. 4307

FOR THE SPECIAL ATTENTION OF ALL OWNERS OF

DESK CALENDARS

During the present year two great victories, known generally as VE and VJ, have been achieved by Gt. Britain and her Allies.

There is, however, another great victory which is anxiously awaited, viz. VF, or "VICTORY FOR FREEDOM." For the accomplishment of this we appear to be destined to wait for an indefinitely longer period than was at one time anticipated, and this has considerable bearing upon the issue of our Desk Calendars.

Our hope that we should be able to issue to our Clients a completely new Desk Calendar and Case for the year 1946 has not materialised, as we are informed by our suppliers that the Paper Control Order is still unchanged and consequently Calendars are still restricted to 1 oz. in weight.

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A "Retriever" Plant

will help to do this by recovering burnable fuel from pan-ash.

IT WILL WASH COKE TOO.

Plants from 1 to 12 tons per hour capacity.

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The "FOUR OAKS" Gold Medal "Bridgwater" Pattern

The special feature of this pump is that the pump bucket works entirely outside the liquid.

18 Gallons, £20 2 6

Other patterns of smaller capacity and lower prices.

Above price plus 10% advance. Owing to the National Emergency all prices are subject to conditions prevailing at the time orders are received.

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NOTABLE DEVELOPMENTS IN ENGINEERING HISTORY, 5

1875

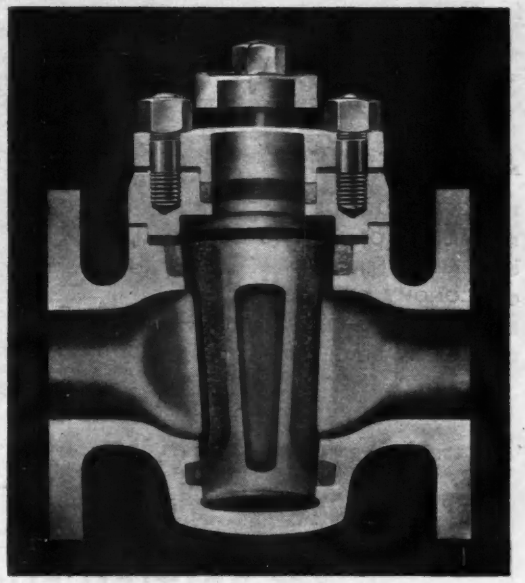
ASBESTOS PACKED COCK

SINCE 1844 the energies of the Dewrance organization have been directed to satisfying the requirements of steam users, and recent announcements have indicated some of our early achievements.

This enterprising spirit has also prompted many other inventions and innovations now commonplace to steam users. The Asbestos Packed Cock is an example, the method employed to form a seal against fluid pressure was an entirely new departure from orthodox practice, when we introduced it in 1875.

We were also the first to supply valves with renewable seats; first to develop in this country the glass toughening process; first to supply Water Gauges with Automatic Valves in both arms, as well as the originators of many other improvements in the construction of boiler mountings.

We were again first in utilizing solid steel forgings for a wide range of steam fittings, a feature in production that avoids the defects inherent in steel castings. The valves and seats are made of "DEWRANCALLOY," a special heat resisting non-corrodible alloy which we developed for important internal components of steam fittings.



The typical construction of an Asbestos Packed Cock is shown in the sectional illustration above; the plug has been removed to show the system of grooves in which the indurated asbestos packing is caulked.

In recent years our Patent Bi-colour Illuminated Water Level Indicator has been successfully introduced. By the application of a simple and direct optical principle the steam and water spaces in the Indicator are clearly shown in red and green respectively; no matter how rapidly the water may rise or fall in the sight glass, the contrasting colours change instantly with every fluctuation of the levels and enable the observer to take an exact and instantaneous reading.

If this brief record should be merely historical, it at least reflects the foresight and alertness of the Dewrance organization and establishes our claim to be foremost in the field in the production of high-grade boiler mountings and steam fittings.

Particulars of our latest products will be given in future announcements.

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Established 1844 *& Co. Ltd.*

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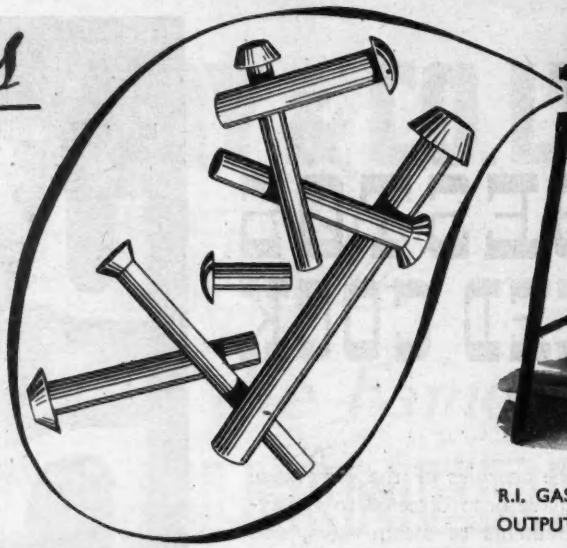
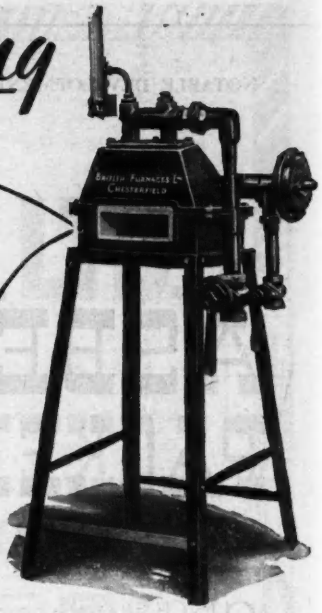
GREAT DOVER STREET, LONDON, S.E. 1. TELEPHONE: HOP 1244 (6 LINES)

Gas Fired Rivet Heating Furnaces





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OUTPUT 1 CWT. PER HOUR

ADVANTAGES:

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- RAPIDITY OF HEATING
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- ECONOMY OF FUEL
- CONTROL OF TEMPERATURE
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PUMPS
FOR GAS WORKS

Fig. 705. "SINGLE-RAM" STEAM-PUMP.

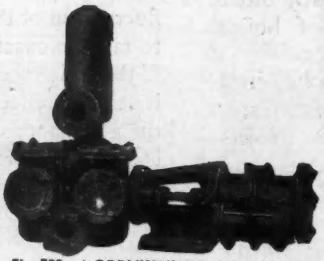

Fig. 598. "CORNISH" STEAM-PUMP FOR BOILER FEEDING, &c.

TRADE MARK LION

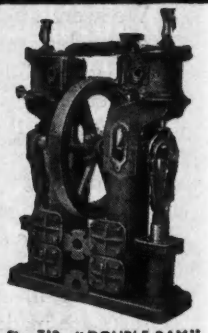

Fig. 712. "DOUBLE-RAM" STEAM-PUMP.

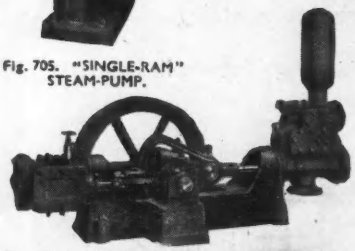

Fig. 680. "RELIABLE" PUMPING ENGINE FOR THIN TAR, AMMONIACAL LIQUOR, BENZOLE LIGHT OILS AND WATER,

Fig. 685. "RELIABLE" STEAM-PUMP FOR TAR AND ALL THICK FLUIDS.

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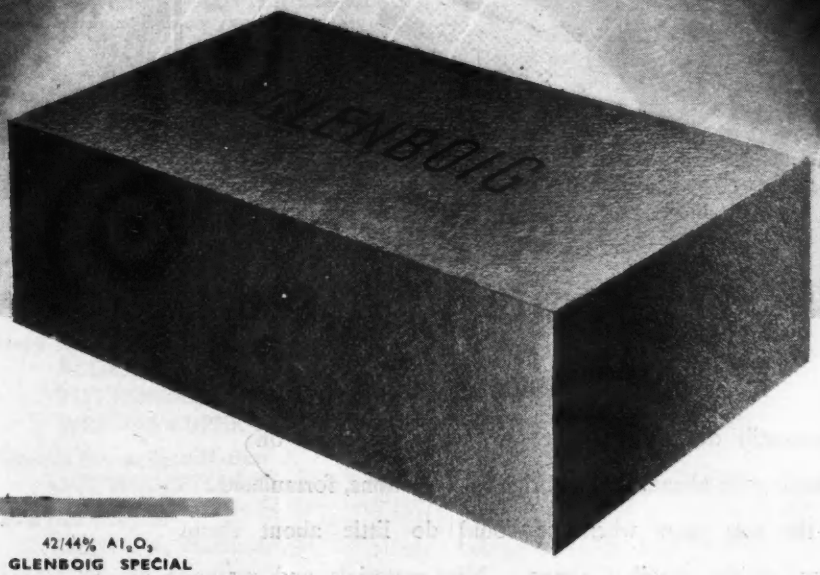

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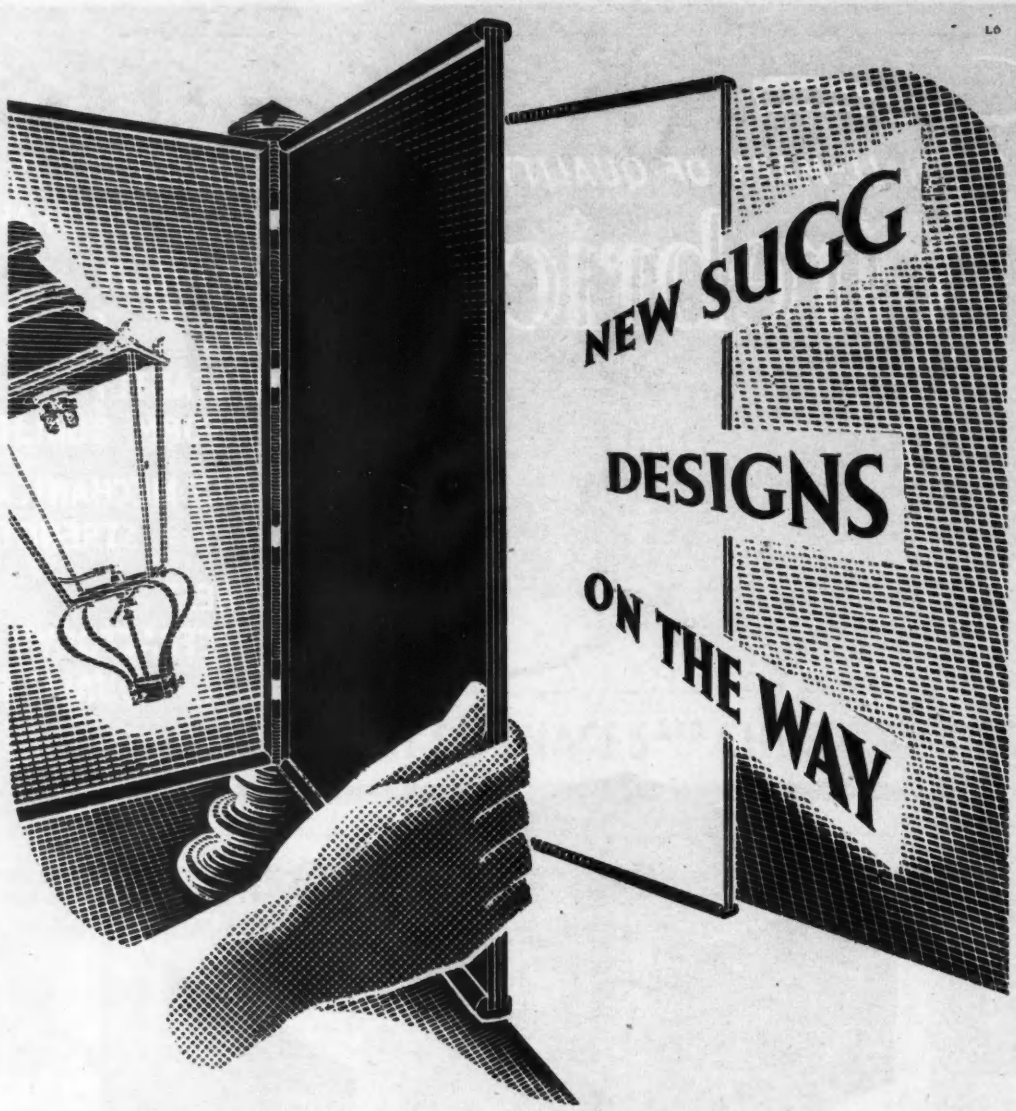

Production of gas lighting units has been at a standstill during the past six years, but ideas on design have gone ahead. Many 'bright' suggestions, formulated during the war years when we could do little about them, are now taking tangible shape. New materials and methods of manufacture are also part of the scheme. The result will be a new and better range of Sugg lamps for improved public lighting.

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BILSTON	49
SALTCOATS (Third Installation)	11
GLASGOW, Tradeston	358
DUNDEE (Third Installation)	142
IPSWICH (Second Installation)	149
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MARCH	28
NEWBURY (Third Installation)	46
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HARWICH	12
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EAST DEREHAM (Second Installation)	4
SPALDING (Third Installation)	9
SIDMOUTH (Second Installation)	5
CARMARTHEN (Third Installation)	10
ELY (Third Installation)	10
WARRINGTON (Fifth Installation)	95
OSWESTRY	35
COLCHESTER	165
Intermittent Vertical Chamber Installations	
ALDERSHOT (Second Installation)	47
TOTTENHAM, Ponders End	469
WESTON-SUPER-MARE (Third Installation)	36
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SOUTHAMPTON (Second Installation)	125
Coke Oven Installation	
LONDON, Beckton	600

A Total Daily Coal Carbonising Capacity of

2,818 TONS

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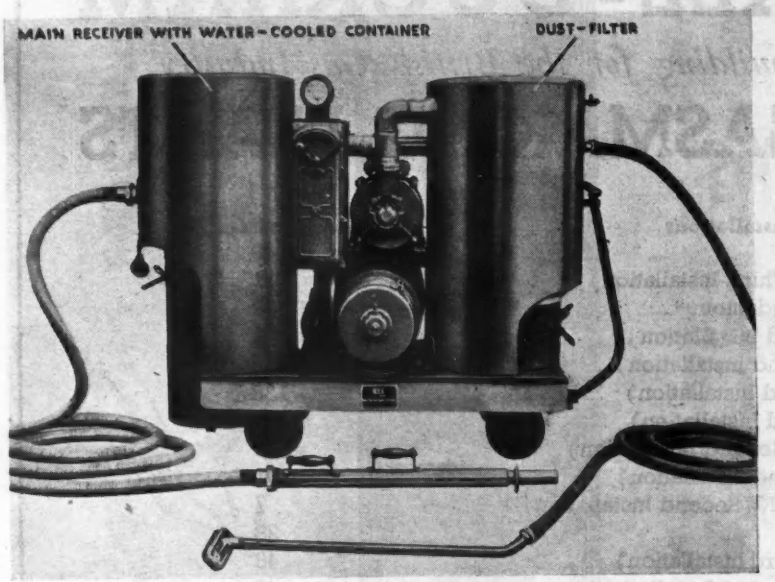
THE B.V.C DUAL-PURPOSE GAS WORKS MODEL



When conditions are unfavourable to the installation of a fixed plant, the new B.V.C. Gas Works Model, Portable will be found very efficient.

This dual purpose mobile unit can be used for removing hot dust from the tops of retorts through the water-cooled container, or for general cleaning, with one or two operators working simultaneously.

We shall be pleased to send you full information on request.

B.V.C. Flue Dust Removal Plant Equipment is used by: The Gaslight & Coke Co. (Beckton, Nine Elms, Southall and Brentford). The Birmingham Corporation Gas Co. The Cardiff Gas Co. The Birkenhead Gas Department. The Commercial Gas Co. The Reading Gas Co., etc., etc.

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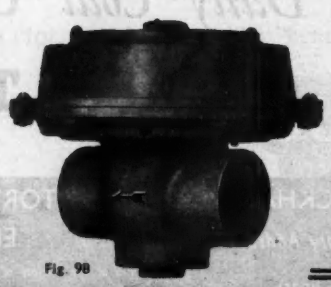

Fig. 98

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Solve all your Fixing Problems

RAWLPLUGS

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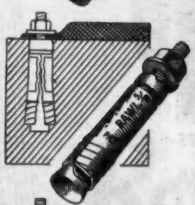
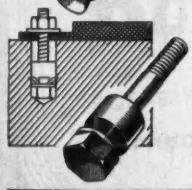


RAWLBOLTS

The use of RAWLBOLTS requires the minimum of time, labour and tools. No grouting is needed. No time-lag waiting for cement to dry. Made in two types—bolt projecting and loose bolt type—they solve every bolt-fixing problem. Available with pipe clips, round and square hooks and eye bolts. Size ¼ in. to ¾ in. diameter. Standard Whitworth thread.



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The RAWLPLUG BOLT ANCHOR is especially designed for fixings of a specialised nature. Unaffected by atmospheric conditions it can be fixed below water if necessary. Full range of sizes available and the anchors will take bolts from ¼ in. to 1¼ in. diameter.

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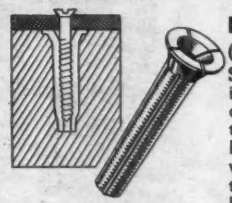

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Specially suited for use where the plug is likely to be subjected to extreme climatic conditions. Made in sizes to take screws from No. 8 to No. 14 and lengths from 1 in. to 2 in. Designed with flange for hollow brick work and to stop plug being inserted too far in hole.

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Specially designed for outdoor jobs where a metal plug is specified or preferred. One end of the plug is "coned" to facilitate the entrance of the screw when it is first inserted.

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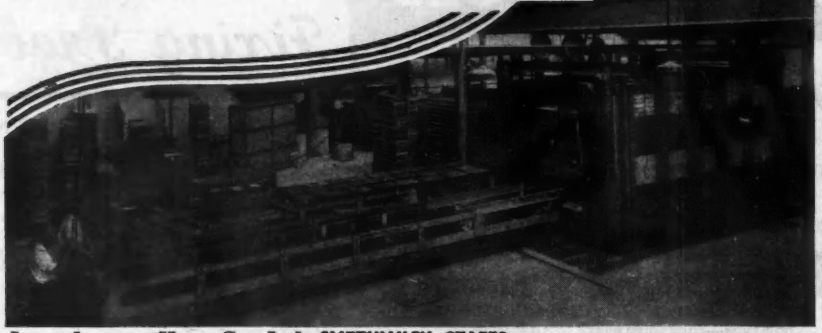

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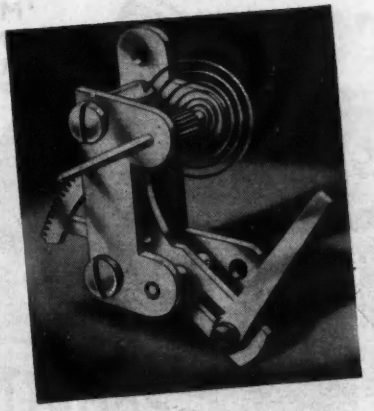

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May we investigate the potentialities offered for fuel-saving in *your* Works?

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YOUR PRODUCTION ASSURED BY PARKER ENGINES

BUILT IN ALL SIZES

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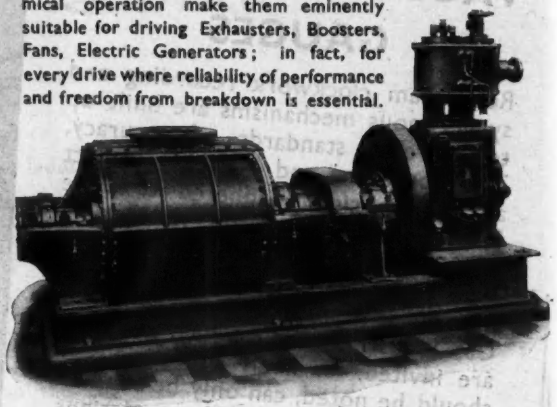

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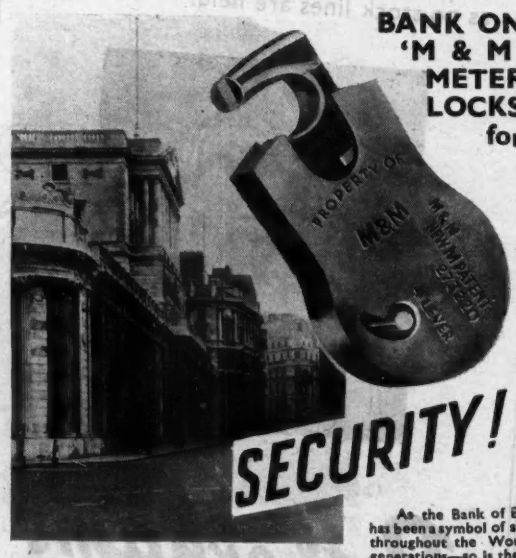

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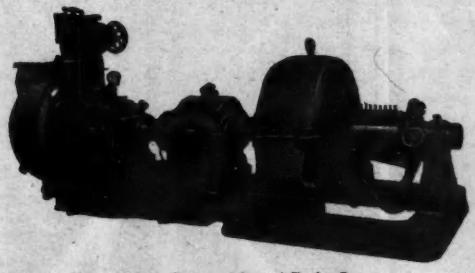

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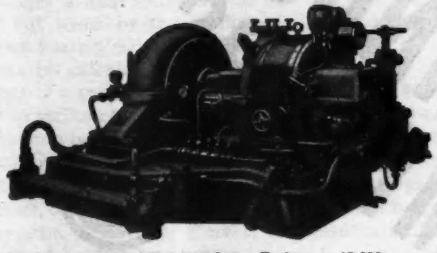

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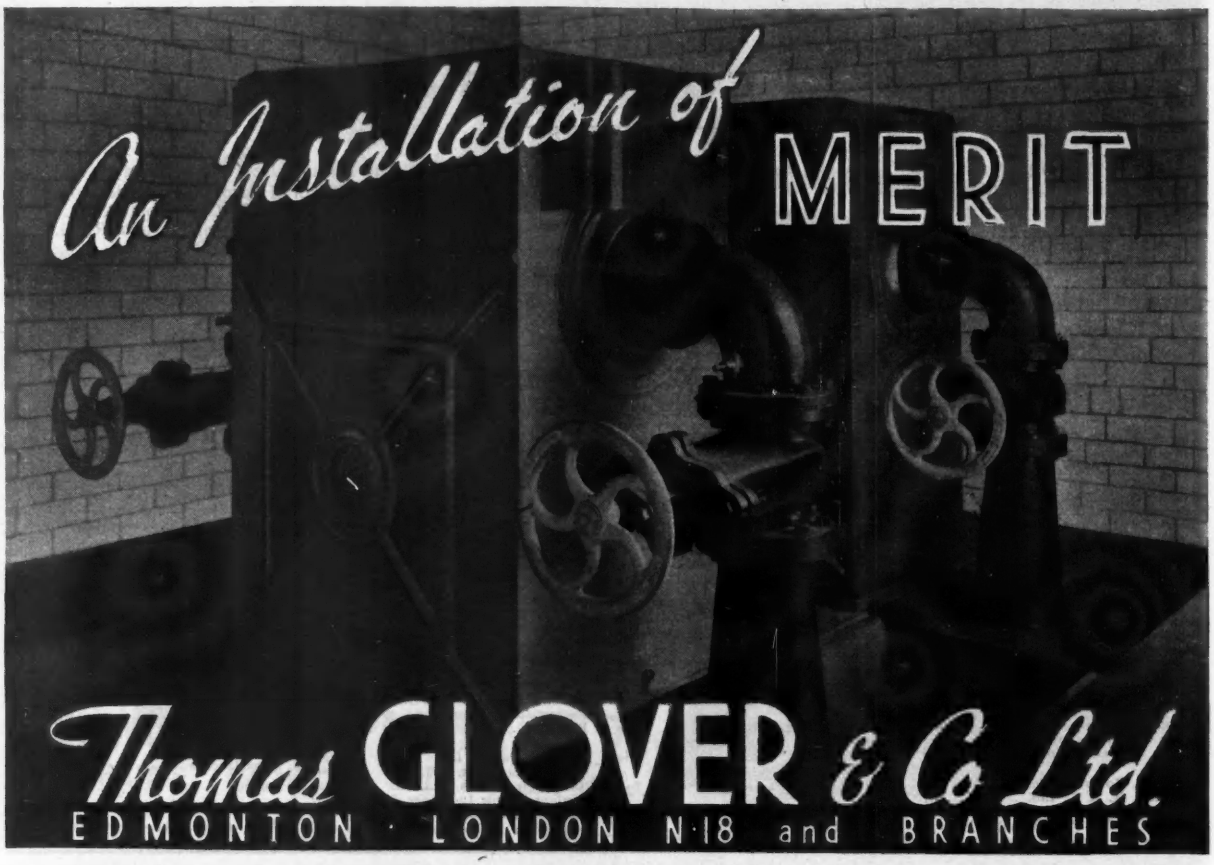

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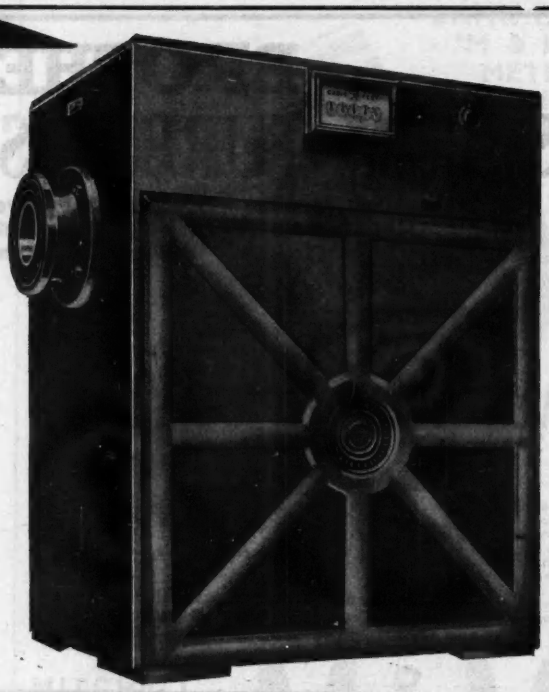

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GAS JOURNAL, DEC. 5, 1945

VOL. 246 97th YEAR No. 4307

EDITORIAL NOTES

THE AUTUMN RESEARCH MEETING

ALONE, or virtually alone, among the senior engineering institutions, the Institution of Gas Engineers gives its members indigestion—technical indigestion—twice a year. When we reflect that within the short space of two days, no fewer than 15 Papers and Reports, for the most part of the highest scientific and technical importance, were discussed to a guillotine timetable, we ask in all seriousness whether the time has not come to modernize the practice of the Institution even as the Industry has modernized its technical practice. Most of the 15 Papers and Reports represented the best part of a year's work of several highly trained people. These Papers and Reports require discussion from two angles: one is the scientific matter they contain, the other is their technical repercussions on the Industry and their influence on any changes in policy which may be required if the conclusions drawn from the work are accepted. Is it fair to the Authors who have spent so much effort in order to advance our knowledge to ask that they shall present their Papers, and have them discussed, in a matter of half-an-hour or so? Is not one reason why there is comparatively little spontaneous discussion on some of the Papers the very fact that those who would speak know that time is not available to do justice to the subject, and they therefore refrain (if the Board of Examiners to the Institution will forgive the slang) from "cluttering up" the time-table?

We recognize full well the real difficulty in that the Institution of Gas Engineers is nation-wide, and that it is difficult for members to travel far afield. The opportunity for a family gathering is irresistible. But we suggest that in the interests of the Industry a change might be made. Will those who attended the meeting remember and take away with them lasting recollection of the summaries, some incomplete, some haphazard, of the work? Will those who were not with their fellows at this technical feast settle down to read such a mass of documents as have descended on the Industry like large, and against the sky, grey snowflakes? Surely there is room for thought why research is not more often translated by the ordinary engineer into works practice.

Has the time come for the Institution (and the Gas Research Board) to change the character of its meetings? It is a pertinent question. Would it be better if the summer meeting comprised not more than two papers per day, in the mornings only, leaving the afternoons for social engagements, organized for those who desire set visits, and for the Papers to be confined but not circumscribed to such subjects as would interest the practical engineer? The more highly technical Papers might well be discussed one at a time at meetings throughout the country—meetings not necessarily held in London. Would it be a good plan for the Institution to set up sections in the nature of local district associations, at which highly scientific Papers could be read and adequately discussed. Surely there is no reason why a scientific Paper should not be given to more than one section. Intellect is not confined within geographical limits. In that way the fullest discussion would be concentrated upon the research work of the Industry. Lest it be objected that this would take up too much of the time of the research workers, we add that the interpretation of research to the common man is as important as the research itself. Discovery without application is useless to industry.

Moreover the general practice of sending a large number of Papers to members a day or two in advance of the meeting is against the work receiving the consideration that it merits. How many members of the Institution can put their hands on their hearts and declare that they come to the Institution meeting having not only read but studied all the Papers down for discussion? Are we wrong in suggesting that few have even read each Paper once? Research papers cannot be adequately discussed or even understood by a single reading, save only perhaps by those who are engaged in the same field and therefore have the subject at their fingers' ends.

DISTRICT HEATING

LET us say, at once, that the quality of the Papers at this year's Research Meeting of the Institution was very high. A great deal of first-rate material was provided for discussion, and though circumstances defeated the staff of the Institution to the extent that all the Papers were not available in advance of the meeting, it is clear that every Paper is well worthy of the most careful study. Among the more outstanding contributions to the meeting was the 1st Report of the District Heating Committee. District heating is one of the more contentious proposals of post-war planning. Its contentiousness has arisen, not from any new technical principle involved, so much as from the almost unreasoning advocacy of some of its supporters. The Report in question puts fairly many of the considerations which must be faced before district heating is introduced anywhere. Its effect on other, existing, public utilities cannot be neglected. There is no merit inherent in the supply of heat by steam or hot water which should cause it to have preferential treatment. The cream of the district, where the costs of distribution and supply are lowest, is the only part of any residential district or of any city wherein it could possibly "pay." Should other members of the public be compelled to pay more for gas and electricity so that some may be supplied with background heat and hot water by the agency of hot water or steam? Will district heating pay when the capital cost of the distribution system (as calculated by the Committee) is four times as great as that of a parallel gas distribution system? The only obvious way to secure equitable recognition of difficulties caused by the interaction between the newer and the older forms of centralized heat supply is to create no new public utility, but to put district heating under the gas or electricity undertakings according to whether the independent or the thermo-electric system is used. It appears doubtful if there is any justification for an uncoordinated independent system.

The report of this Committee has received confirmation from a Paper presented before the Institute of Fuel by Professor Kapp, the Pender Professor of Electrical Engineering at University College, London. Pointing out that a prime reason for the non-acceptance of district heating in Great Britain is that "we have to contend with certain hard engineering and economic facts," Professor Kapp deals with the thermo-electric system as

applied to power station waste heat. The advantages of district heating are summarized as the convenience of heat on tap, smoke abatement, and coal conservation—all advantages, by the way, equally characteristic of the Gas Industry. The effect of utilization of pass-out steam is that a power station "can use a given coal consumption for the generation of 100,000 kw. of electrical energy alone, or of, say, 80,000 kw. of electrical and 180,000 kw. of heat energy. There is in consequence a saving in coal or more than one-third if heat and electricity are produced from a combined station instead of from two separate stations." As against this credit balance to electricity generation Professor Kapp lists a number of difficulties militating against the adoption of district heating. Houses are not equipped for central heating, and will require piping and radiators; the number of consumers per square mile is less than in foreign cities where district heating has been applied; streets congested with existing services will find difficulty in accommodating yet another; there is uncertainty in forecasting how many residents will become consumers; technical details are still a matter of uncertainty; metering will prove difficult; since most generating stations are outside towns, the supply mains must be so long that the cost would be prohibitive; existing generating stations are not equipped for back-pressure working, and could only be justified for new stations or extensions. Moreover the Institution Committee has shown that the supply of heat by coke and gas required a good deal less heat than the supply of the same thermal quantity from a thermo-electric station. Our conclusion from the First Report of the District Heating Committee and Prof. Kapp's Paper is that except possibly in a very limited field, district heating *as a serious economic proposition* in this country is impracticable.

DISTRIBUTION

THE distribution and utilization of town gas was a subject much to the fore at the Research Meeting. Colonel Carr pointed out that our distribution systems have been built up haphazard over a number of years; small systems have expanded into great systems as the area became more populous. It may be too late to do much about it, but surely one day we shall have to put our houses—and our cities—in order. With town planning may well come the planning of the public utility services. We have set up committees to issue Codes of Practice for the installation of gas appliances. Is it desirable for the Institution to issue a Code of Practice for the design of town and country distribution systems? Have we gone nearly as far as we should have done in the direction of automatic pressure control? Colonel Carr is clearly of the opinion that a lot more might be done in this field. The maintenance of the correct pressure is very important, as many discovered during the war, and are still discovering during the strikes that have proclaimed the outbreak of peace.

The future of the Gas Industry lies in the field of gas distribution and utilization. We shall be surprised if the Government scheme for the reorganization of the Gas Industry does not visualize more central carbonizing plants, with the shutting down of the small works except in isolated places. Consequently, while carbonization and methods of making gas must still be of the highest importance, there will be more scope for the ambitious individual on the distribution side. The utilization of gas and coke will be of the highest importance. The Fuel Efficiency Committee of the Ministry of Fuel and Power has discovered very great wastage of gas in industry, which implies that the Gas Industry has not yet brought to the knowledge of industry in general the manner in which gas should be used most effectively. The utilization engineer has great and important work to do, and his status should grow with the years. Does the Industry recognize him for what in fact he is worth? Does the Institution give him the recognition he should have? If our own views on these matters are wrong we err in the vast company of those who should be gas utilization engineers, and who are not. We err in the company of the Education Committee, who deplore their inability to attract anything like sufficient students into that branch. It is a very interesting type of work that can employ the full faculties of men of the highest calibre. But somehow the work and the prospects do not prove attractive. The answer to this problem may well demand some drastic changes in our scales of payment and in our scales of value. The question requires answer—now.

CARBONIZING PLANT DESIGN

THE Paper by Mr. Farror on an experimental retort setting proved highly interesting. There is nothing inherently new in the general ideas; we have before us a drawing of a setting of chambers of rectangular shape, but with regenerators instead of recuperators; such settings have been fitted with means for waste gas recirculation. Nevertheless the results obtained proved most encouraging. The Author might well have assessed the quantity of waste gas recirculated, because there are doubts whether the recirculation now attained is sufficiently large. The two bottom retorts are clearly heated to a much greater degree than the upper retorts—a state of affairs which recirculation should avoid. We do not know whether Mr. Farror's attention has been drawn to the Koppers circulation coke oven, in use at Beckton and other places, but in this the extent of recirculation is designed to equalize the heating, and therefore the temperature over the whole height of the oven wall. We hardly suppose that this objective is completely secured, but such evidence as we have suggests that it is sufficiently secured for practical purposes.

The design of Mr. Farror's retorts needs some modification, such as larger recuperators, but we have no doubt that when he builds a second setting his results will show a considerable improvement. In the light of the remark of one speaker that the coke oven is more efficient than the gas retort, does this make possible that when (and if) greater centralization of production occurs, more of the production of gas will be in coke ovens? Mr. Farror's retort setting may be considered as being half way towards the coke oven. Is the next step to build coke ovens with the chamber divided into a number of horizontal retorts? Is there any insuperable difficulty in increasing production in horizontals by making gas retorts longer, say up to 30 ft. in length, and so reducing labour costs?

RADIANT HEATING

OUR congratulations go to Dr. Roberts and Mr. Long for the Report on radiant heating. It is an important conclusion that no matter whether radiation or convection is used, the result is the same so long as the same degree of heat treatment is applied. Radiant heating has been developed in a smoke-screen of pseudo-science, and it is a very useful work to dispel the ignorance which has accumulated, perhaps for commercial reasons, round this most important subject. Clearly gas is equally as effective as, and probably cheaper than, electricity for the purpose.

A curious omission strikes us in the absence of any communications on work on coke. On the face of it the Gas Industry seems to concentrate its research almost wholly on gas. It may be that gas is the fuel of the future, when the Britisher has been educated to do without his solid fuel fire, when he can afford to use gas exclusively. But that day is not yet, and many speakers emphasized that the Gas Industry is a two-fuel industry. One would hardly think from the Papers that nearly twice as much heat is produced in the form of coke as in the form of gas. But the combination of gas *with coke* is still the Industry's best answer to competition, and we hope to see work on coke carried out by the Gas Research Board.

We have commented on but few of the Papers, and we have avoided commenting on the contributions made by the Gas Research Board. That pleasure we put off to a later date, partly because it is unfair to the Authors to comment upon summaries only. But broadly, from the point of view of the quality of the contributions, this year's Autumn Research Meeting has in many respects been memorable.

Road Tar

More than a year ago the British Road Tar Association practically doubled its contribution, which is on a 50/50 basis with the Department of Scientific and Industrial Research, to the work at the Road Research Laboratory at Harmondsworth. Mr. Davidson Pratt, Chairman of the Association, told us this at an informal luncheon to the Press at Brown's Hotel last Wednesday. Such informal meetings—and the Press appreciates informality—have during the war taken the place of the "bigger" occasions of the old days, when Ministers and captains of Industry were apt to hide needles in haystacks. Last Wednesday the Chairman was able to make a direct and simple request to the Press, lay and technical, that it should assist the Association in making known to those ultimately concerned—surveyors, manufacturers, and even the uninitiated public, may we say—the results of research and practical tests.

Improved Specifications and a Trade Mark

Referring to the improved B.S. Specifications for road tar and macadam, Mr. Pratt said the full value of the latter would probably not be realized until the coated stone industry had been able to overhaul its war-weary plant; but the formation of a Federation of Coated Macadam Industries, with which the B.R.T.A. is actively co-operating, would hasten this desirable attainment. Mr. Pratt also announced that in order to give the user a cast-iron guarantee of quality for the tar, the B.R.T.A. has adopted a Certification Trade Mark which it intends to use at the beginning of next year's road season in March. The Association's scheme of control is so rigorous that it has been approved by the British Standards Institution, and sanction has been obtained for users of the B.R.T.A. Mark to use also the British Standards Certification Trade Mark. This involves a regular system for testing all supplies of road tar by the maker before they leave his works. In addition, periodic visits and check tests will be made by the B.R.T.A. representative to ensure that the standards of quality are maintained. Thus the quality of British road tar is being guaranteed by the Association, and the user need have no further worry on this point.

A New Book of Practical Importance

Now ready for sale and available on application to the "Journal" Offices, 11, Bolt Court, Fleet Street, E.C. 4, is a new book on "Retort House Technical Control," by A. R. Myhill. The price of this valuable aid to carbonizing practice, written by one immersed in the subject actively for many years, is 12s. 6d. post free. A review of the book will appear in our next issue.

Personal

Editor, "Gas Journal"

Mr. Norman S. Smith, B.Sc., Assoc.M.Inst. Gas E., is appointed Editor of the "Gas Journal" and allied publications in place of the late Mr. Rupert King.

During the first World War Norman Smith went on active service in 1917, being granted a Commission as Second Lieutenant in the Royal Flying Corps and gaining his wings as a pilot in 1918. Thereafter he completed his studies under Professor Cobb at Leeds University, graduating in 1922. After a short term of gas-works and general engineering experience he was introduced to us and strongly commended by Professor Cobb, and he joined the "Journal" staff as Editorial Assistant under the late Mr. Arthur Bezant. On the death of Mr. Bezant in 1928 he was appointed Assistant Editor, and in 1934 Technical Editor, in which capacity he has been responsible not only for the technical leaders and abstracts in the "Journal" and "Gas Service," but for various text-books. His collaboration as a trained engineer and a skilful writer has been increasingly sought for in the Industry. During the past five years circumstances have brought Norman Smith into the closest daily contact with the late Editor, and they have collaborated in every phase of our publishing work.

Clifford A. King,
Managing Director.

* * *

Alderman Harry Riley, J.P., Chairman of the Stalybridge Gas-works Committee, has been appointed Mayor of Stalybridge.

* * *

Mr. Roger G. T. Powell, Assistant Gas Engineer to the Farnham Gas and Electricity Company, has succeeded Mr. Frederick J. Smith as Manager of the Burgess Hill and St. John's Common Gas Company.

* * *

Alderman Sir Albert Ball has been re-elected Chairman of the Nottingham Gas Committee, and Mr. J. B. Griffin has been re-elected as Vice-Chairman. Sir Albert Ball has been Chairman of the Committee for 40 years.

The Directors of the Cardenden (Fife) Gas Company have appointed Mr. Archibald Coubrough, formerly Manager of the Duns Gas Company, Ltd., to the position of Engineer and Manager.

* * *

Mr. B. H. Harrison, of the Rugby Gas Company, has been appointed Chemist and Technical Assistant to the Hinckley Gas Department. Mr. Harrison is the son of Mr. E. T. Harrison, Manager and Secretary of the Lutterworth Gas Company.

* * *

The Institute of Vitreous Enamellers, at its annual meeting in Cardiff on Nov. 30 appointed as President-Elect Mr. R. J. Rogers, Managing Director of the Parkinson Stove Company Ltd., and Past Chairman of Council, S.B.G.I.

* * *

Mr. C. B. S. Mitchell, Assistant Engineer and Manager of the Dunfermline Gas Department, has been appointed to a similar post with the Ayr Gas Company. A native of Northern Ireland, Mr. Mitchell has been with Dunfermline Corporation since 1941, previously holding posts at Stirling and on the Continent.

* * *

Mr. W. J. Sandeman, J.P., Chairman of the Executive and Publicity Committees of the British Commercial Gas Association, has retired. He held the former office for eight years and the latter for the past two years, and for a long term held office as Honorary Treasurer to the Association.

* * *

Mr. F. A. Rhead, Assistant Engineer and General Manager of the Exeter Gas Light and Coke Company since 1936, has been appointed Engineer, Manager, and Secretary of the Peterborough Gas Company. Mr. Rhead, who was educated at King Edward VI School, Stourbridge and Birmingham and Liverpool Universities, has been awarded two Silver Medals by the Society of British Gas Industries. Joining the Redditch Gas Company in 1925, he later became Assistant Gas Engineer at Stourbridge and Wallasey before taking up his present appointment.

* * *

The retirement of Mr. A. S. Campbell from the position of Secretary and Commercial Manager of the Wellingborough Gas Light Company as from the end of the year is announced. Mr. Campbell joined the Company in September, 1899, successively occupying the posts of Secretary, Secretary and Commercial Manager, and Director, and is retaining his position on the Board. During the 30 years that he has held the position of Secretary he has been in large measure responsible for the guidance of the Company's policy. During this period the sales have increased from 93 million cu.ft. to 462 million cu.ft., and the number of consumers has risen from 5,500 to over 11,400. In addition the Company has studied the contentment and well-being of its employees, and during Mr. Campbell's career has inaugurated both Co-partnership and Pension Fund schemes, being one of the earlier companies to do so. Consequent upon Mr. Campbell's retirement, Mr. C. C. Wood becomes General Manager and Engineer, Mr. D. A. Foster, Assistant Manager and Engineer, and Mr. T. P. Pateman is appointed Secretary.

Obituary

Mr. W. M. Galleway, a Director of the Whitby Gas Company, and who for over 40 years before his retirement in 1937 was Secretary and Manager of the Company, died at his home in Whitby on Nov. 25. He was a Past-President of the North of England Gas Managers' Association.

* * *

Mr. William H. McKerracher, formerly ex-manager of Lesmahagow Gas Light Company, died at his home, New Road, Lesmahagow, on Nov. 28. He was 84, and had been in poor health for some months. He leaves four sons and three daughters.

* * *

Mr. Peter Low, Engineer and Manager of the Elgin Gas Department since 1929, has died at the age of 53. Since his appointment he had seen big developments in the gas undertaking, and was in charge when the new works were opened at Pinefield. He was a native of Montrose, and was chief draughtsman and engineer at Dundee before going to Elgin.

The Special Committee of the National Joint Industrial Council for the Gas Industry, set up to consider all the terms and conditions of employment of gasworkers, has completed its report, which will be considered by the full National Joint Industrial Council at an early meeting.

Letters to the Editor

Nationalization and the Gas Industry

SIR,—Mr. Herbert Morrison, in introducing the Government's proposals for socializing the Gas and Electricity Industries, uttered a veiled threat that if undertakings did not assist socialization by carrying on their business properly before it took effect they would suffer for it.

Responsible administrators of gas undertakings, deriving their authority direct from Parliament, do not need the effrontery and impudence of Socialist Ministers to instruct them how to carry out their statutory obligations to the public, and it is hoped that the Gas Industry, in common with all other threatened industries, will fight tooth and nail against these proposals. It has, of course, not been realized by the public at large just what the transfer of these great industries to the control of political power really means.

Rumour has it, however, that the pass has already been sold, though, as far as I know, the Gas Industry has not been consulted in respect of this vital issue. For my part, I should like to see all gas, water, electricity, and other similar industries getting together to fight for freedom, but moves must be made quickly, and industry will have to put its hand into its pocket deeply to establish a fund for the education of the public if it wishes to remain free.

The idea that politics must be kept out of business is as dead as a door-nail. Nationalization is politics to the *n*th degree, and industry, if it would save itself, must take the gloves off and fight. Should a few of your readers share my views, I hope they will do all in their power to induce a fighting spirit in others up and down the country, so that public opinion against nationalization may be strengthened.

I append a draft of a letter which I suggest might, with advantage, be sent out to all shareholders as an initial step in such a campaign.

Yours faithfully,

HYDE C. BURTON.

5, *Great Winchester Street,*
Old Broad Street,
London, E.C. 2.
Nov. 23, 1945.

SUGGESTED CIRCULAR TO STOCKHOLDERS.

The Directors consider it incumbent upon them to direct the attention of the stockholders to the trend of recent and prospective legislation as affecting their interests.

The nationalization (or socialization, to give it its proper name) of public utility undertakings must inevitably involve the transfer of the direction, administration and control to Whitehall. The Gas Industry has been specifically indicated for such treatment, and once the State has assumed control, it will pass beyond the cognizance and influence of the investing public.

Moreover, the control of general investment, which is now contemplated, strikes at the basic right of any investor to invest his money, either on his own account or as a trustee, as he pleases. In particular, the socialization of gas, water, electricity and other utilities will remove from the small saver stable and satisfactory investments wherein his money may earn reasonable interest with safety and with a prospect of gradual improvement.

All these matters need not only the most vigilant personal attention of those whose interests are so threatened, but also vigorous action in opposing these measures by every constitutional means open to them, such as letters to Members of Parliament, letters to the Press, the holding of meetings, attendance at annual general meetings, and the support of one of the several organizations now in being for the purpose of safeguarding the personal liberties of the citizens of Britain.

"Evaluation of Performance"

DEAR SIR,—I have just read the Paper "Evaluation of Performance" by Mr. Leopold Friedman, and I would like to congratulate him on a very interesting contribution. There are, however, two points on which I would like to comment.

Mr. Friedman mentions that instantaneous gas water heaters with remote control were in existence long before 1914. As a matter of fact multi-point geysers were in production before 1900, and many have given reliable service for over half a century. Sealed and open geysers, sink heaters, &c., were also in general use at the same period, and hundreds of thousands of British heaters of these types are still in daily use in this country and abroad.

This full range of water heaters was designed according to the needs and technical possibilities of the period. Their capacity, in general, was bigger than at present, 4 gall. per minute, and even more, being quite an ordinary size. Their efficiency was as high as that of the most modern types. They would certainly not take the overload required by modern combustion standards, but we must not overlook the fact that at that time the gas pressure was fairly equal all over the country, and was bound to be so with regard to the then all important lighting load.

Their appearance was somewhat austere, but even so it was preferable by modern standards to the over-decoration fashionable in those days. On the other hand, these "trial and error" geysers required much less maintenance than some of the most modern heaters. If we are not mistaken, many of the gas undertakings would not mind a return to modernized editions of those simple and robust designs, not even excluding the open types.

In the section about British Standards, Mr. Friedman gives the impression that our national standards are unduly low—so low as to take away any incentive to improvement. As a specific example is given the combustion standard of 0.02 limit ratio for CO/CO_2 under abnormal conditions—*i.e.*, 100% pressure overload over non-governed and 50% over governed appliances. The U.S.A. Standard specifies that not more than 0.04% CO shall be present in the air-free products of combustion when tested at a gas pressure of 1.5 normal, irrespective of absence or presence of pressure control. The British Standard consequently encourages the use of integral governors, which, so far, have been considered an improvement. For non-governed appliances it specifies 100% overload against 50% in the U.S.A., on the other hand allowing a slightly higher amount of CO.

It is impossible to predict in a general fashion what ratio of CO/CO_2 would be present at 50% overload in a heater showing 0.02 at 100% overload; it could, however, be assumed that as a rule appliances which conform to the British Standard at 100% overload would easily comply with the U.S.A. Standard at 50% overload only.

Again, with regard to thermal efficiency, the U.S.A. Standard specifies "not less than 70%" for instantaneous heaters. This is less than generally accepted in Great Britain. I would not regard our own standards as too low, as they keep so well in line with those of the U.S.A., which definitely cannot be described as a second-rate industrial country.

Standards should specify a definite performance under definite conditions in order to give the maximum inducement to progress. A limiting figure, like the suggested 80% CO_2 maximum limit, might be quite alluring at the moment as a reasonable average of existing designs, but it would penalize, for instance, the designer of a burner with absolutely perfect combustion—*i.e.*, it would become exactly a standard to hinder progress. Apart from the question of appearance, the development of the geyser has taken place in three stages:

Design for efficiency.—Here the desirable maximum has been reached, many years ago; in fact, thermal efficiency was occasionally overdone in times past, and no great improvement above the present standard seems desirable.

Design for safety.—Great advances have been made during the last twenty years, and existing standards guarantee a very reasonable level.

At present we have entered the third stage—*design for long life and reduced maintenance.* Much still remains to be done in this direction, and every step towards this end should be encouraged; if this important point is fully appreciated, some designs which have become old-fashioned during the wars may have to be re-considered for their robustness and simplicity. What the customer wants in the first place is real hot water and plenty of it, with as little trouble as possible.

Yours faithfully,

G. EWART (Director,
Ewart & Sons, Ltd.).

169, *Regent Street,*
London, W. 1.
November 29, 1945.

Diary

Dec. 6.—Institute of Fuel: Institution of Mechanical Engineers, Storey's Gate, 6 p.m. Paper on "The Development of the Job of a Service Engineer," by O. W. Roskill.

Dec. 6.—Town and Country Planning Association: Lunch-time meeting, 28, King Street, Covent Garden, W.C. 2. Talk and discussion on "Heating the Family Home."

Dec. 7.—North of England Gas Managers' Association (Auxiliary Section), Newcastle, 2.15 p.m.: Address by J. M. A. Mitchell, Newcastle and Gateshead Gas Company.

Dec. 8.—Scottish Junior Gas Association: Joint meeting of Eastern and Western Districts, Glasgow. Address by Dr. Harold Hartley.

Dec. 8.—Yorkshire Junior Gas Association: Demonstration of Flame Propagation by Professor D. T. A. Townend and Dr. J. E. Garside, Leeds University, 2.30 p.m.

Dec. 11.—Midland Junior Gas Association: Paper on "The Treatment of Water for Industrial and Domestic Purposes," C. J. Carter.

Dec. 12.—British Gas Council: Gas Industry House, 2.15 p.m.

Dec. 12.—Institute of Fuel, North-Western Section: "Waste Heat Recovery by Means of Recuperators," G. N. Critchley, Engineers' Club, Manchester, 2.30 p.m.

Dec. 14.—London and Southern District Junior Gas Association: Paper on "Design and Installation of Small Industrial Canteens," D. G. Winslow; Paper on "Bread Baking," A. E. Livett.

Dec. 17.—London and Counties Coke Association: Finance Committee 11 a.m., Executive Committee 11.30 a.m., Central Committee 1.30 p.m., Gas Industry House.

The Minister of Health has sanctioned the borrowing by the Plymouth City Council of £14,000 for the provision of gas mains and services on the new Ham housing estate. The Gas Committee Council has approved estimates of £9,000 for the provision of similar mains and services on the Honicknowle housing estate, and application is to be made for the requisite loan.

Gas in Aberdeen

The gas services of Aberdeen are described in an informative handbook issued by the City Corporation. Since the Aberdeen Gas Company was taken over by the Corporation in 1871 it has been so developed that, just pre-war, the city could claim to have the lowest price for gas in any British city or town.

The population in the area supply is estimated at 190,000, and current details show that 2,192,170,000 cu.ft. of gas was made during the year to May 31, at an output of 8,071,000 cu.ft. per 24 hours. The report gives the number of meters in use as 56,077, of which 28,650 were ordinary and 27,427 prepayment. The number of cooking appliances on hire and loan amounted to 37,467, and 6,898 gas fires and radiators were on hire.

During the war operating costs have risen steeply, particularly in the case of coal, where the present price per ton is 84% above the 1939 figure and its quality is much inferior. Labour shortage, too, has made it difficult to meet the increased demands of the Department, as is shown by the fact that, despite war advances and allowances, the annual wages bill has increased by only 28% during the war. Renewals and extensions have nevertheless been carried out, and the low price has only been possible by encroaching on reserve funds to an extent which has now made it necessary to increase the price of gas. The demand for gas during the war has risen by 16.36%, while, disregarding the gas used for public lighting, the increase in demand for domestic and industrial purposes has risen by over 20%.

World Power Conference

A meeting of the International Executive Council of the World Power Conference was held at the Euston Hotel on Nov. 20 and 21, to discuss the post-war revival of the activities of the Conference. Sir Harold Hartley, Chairman of the Executive Council, presided. About twenty countries were represented, including Australia, Belgium, Canada, Czechoslovakia, Denmark, France, Great Britain, India, Ireland, Luxemburg, Mexico, the Netherlands, New Zealand, Poland, South Africa, Sweden, Switzerland and U.S.A. Mr. Harold Hobson, Chairman of the Central Electricity Board, led the British delegation.

The Conference was founded in Great Britain in 1924, the first Plenary Meeting being opened by the Prince of Wales in the Conference Hall of the British Empire Exhibition at Wembley. The second Plenary Conference was held at Berlin in 1930, and the third at Washington in 1936. In addition a number of Sectional meetings have been held in different capitals. Before the war the Conference published a Statistical Year Book containing data on all sourses of energy, giving both natural resources and annual production. It was decided to resume publication of the Year Book as soon as possible.

At the Council Meeting just concluded, it was decided to hold, if possible, a Sectional Meeting in 1947 to discuss the general question of fuel economy; the place of this meeting will be decided at a meeting of the Council to he held in Paris next spring.

The following resolution was passed unanimously: "In view of the future significance of atomic energy over the whole range of power problems, this Council resolves to appoint a small committee to watch developments and to make recommendations to the International Executive Council of the World Power Conference as soon as it is practicable to have an effective discussion of the utilization of atomic energy for industrial and domestic purposes."

Brighton Arbitration Awards

The Brighton, Hove, and Worthing Gas Company was recently called upon to appear before the National Arbitration Tribunal to answer questions raised by (1) the Amalgamated Union of Building Trade Workers of Great Britain and Ireland, and (2) the National Union of General and Municipal Workers. The question raised by the former Union was whether the Company was under an obligation to observe in respect of its employees engaged on the construction, reconstruction, maintenance and repair of all firebrick work on retorts, retort furnaces, oil gas generators, and boiler settings, and on all other work, whether constructional or reconstructional, maintenance or repair work in or about the undertaking, terms and conditions of employment not less favourable than those contained in an agreement existing between the Federation of Gas Employers and the Union with regard to bricklayers and masons, and if so, whether the obligation was being carried out. In the latter case a similar question was raised in respect of employees engaged in the manufacture and distribution of gas, the terms and conditions cited being those recommended by the National Joint Industrial Council for the Gas Industry and agreed by the Southern Regional Joint Industrial Council. The Brighton Company is not a member of either the Federation of Gas Employers or the Joint Industrial Council.

Representatives of the parties were heard at sittings of the Tribunal held in London on Nov. 8 and 9. Evidence was given as to the rates of pay, war bonus, and overtime payments. In each case there had recently been a change in the system of calculating war bonus, and in the case of the gas workers there had also been a variation in the basis of overtime payment, overtime becoming payable after 49 hours instead of 50. The Company contended that the terms and conditions as observed were, when viewed as a whole, in fact more favourable than the "recognized terms and conditions," also when viewed as a whole.

On both questions the Tribunal found that the "recognized terms and conditions of employment" which, or terms and conditions not less favourable than which, the Company was required to observe in respect of the workers concerned were the terms and conditions laid down in the agreement and recommendations referred to. It also found that the Company was in fact observing terms and conditions not less favourable than the recognized terms and conditions of employment, and awarded in accordance with these findings. Full details have been published in Awards Nos. 798 and 799, issued by the Stationery Office.

Chemical Engineering at Leeds University

A gift by Mr. Charles Brotherton of £55,000—£50,000 of which is under a seven-year covenant—to provide a new Chemical Engineering Laboratory, was announced at a recent meeting of the Council of Leeds University. The benefaction is in keeping with the recognition of the importance of the subject now general in this country; the Universities of London and Cambridge have also benefited recently by endowments to provide for this field of study.

The Department of Coal Gas and Fuel Industries with Metallurgy, which provides the course in Chemical Engineering, was established in 1906 to give training in Fuel and Metallurgy. In 1910 a degree in Gas Engineering was introduced, following the endowment of a Chair by the British Gas Industry to perpetuate the memory of Sir George Livesey; this was followed later by contributions to a building fund. The degree course in Gas Engineering has been largely Chemical Engineering in character, and it was provided at a time when the latter subject met with little academic recognition. In 1942 the scope of the curriculum at Leeds was widened, and a four-year Degree Course in Chemical Engineering added to meet the needs of those passing either into the contracting side of the Gas Industry, or into the Chemical Industry generally.

Among many other generous gifts to the University, Mr. Brotherton has already given liberal support to Chemical and Gas Engineering. In 1942 he provided four Undergraduate Scholarships, and in 1943 a Research Assistantship; in 1944 he made a donation of £1,000 for equipment, and £1,000 per annum under a seven-year covenant for a Brotherton Lectureship.

Dr. J. S. Forsyth, at present Brotherton Research Assistant in Chemical Engineering, has now been appointed Brotherton Lecturer; he was formerly an Institution of Gas Engineers Research Fellow, and later on the staff of the Tottenham and District Gas Company.

Rapid Progress at Port Talbot

Some remarkable figures are given by Mr. E. M. Edwards, Engineer and Manager of the Port Talbot Gas Department, in his recently issued report for the year ended Mar. 31. Gas sales amounted to 665 million cu.ft. against 644 million cu.ft. for the previous year. In 1931–32 the corresponding figures were 153 million cu.ft., and in 1938–39 the total was 218 million cu.ft. Gross profit has increased from £8,180 in 1931–32 to £14,543 in 1938–39, £17,986 in 1943–44, and £22,771 for the year under review. Mr. Edwards remarks that in view of the strong position built up during recent years a point has been reached when it is not desirable to add to the credit balance of the appropriation account. Unless in future years it is desired to finance substantial capital expenditure from revenue a net profit is not now required, and as far as possible income, expenditure, and gas prices should be controlled accordingly. Unaccounted-for gas was 3.5% against 3% for the previous year, due to strains from heavy military traffic, vibration from bombs and mines, and the retarding of meter and service renewals.

The increased demand during a period in which the undertaking was deprived of the services of 50% of its pre-war staff and employees presented many problems, and the continued shortage of experienced technicians and experienced staff and craftsmen was acutely felt. Plant extensions and arrangements for coke oven gas supply enabled the Department during the war years to meet all consumers' requirements, and to augment the gas supply in the neighbouring borough of Neath.

The price of gas has remained at pre-war rates throughout, and Mr. Edwards promises an early report on the possibility or otherwise of recommending a reduction. Dealing with the future development of the undertaking, Mr. Edwards sets out a number of important features to be borne in mind, particularly the possibility of the development of a major gas grid scheme for the whole of industrial South Wales and Monmouthshire, and the prospect of nationalization of the Gas Industry in the near future. It is clear, he says, that a substantial measure of unification and co-ordination of the Industry must be effected without delay if it is to play its proper part as a large fuel industry.

The Autumn Research Meeting

THE Eleventh Autumn Research Meeting of the Institution of Gas Engineers was held on Tuesday and Wednesday of last week at the Institution of Mechanical Engineers, London, under the Presidency of Colonel C. M. Croft, D.L., J.P., M.Inst.C.E. There was a large attendance, and the programme was an exceedingly full one.

At the outset the President welcomed back those members of the Institution who had served their country and had returned safely. He specially mentioned Major Fred Bedford, who was Municipal Gas Engineer at Singapore; and Major R. C. Pemberton, M.C., Technical Assistant, Wellington Gas Company, New Zealand.

Chairmen's Technical Committee

Mr. S. E. Whitehead (Chairman of the Committee) then introduced the Report of the Chairmen's Technical Committee, 1944-45. He explained that the Committee existed to co-ordinate the work of the various Technical Committees of the Institution, and also had the advantage of keeping in close touch with the Gas Research Board, whose Chairman was a member of the Committee; he was accompanied on that Committee by the Chairmen of the various Technical Sub-Committees of the Gas Research Board.

The Report, continued Mr. Whitehead, called for little comment; but he was sure it would convey to members some idea of the large amount of work carried out by the Chairmen and members of the various Committees under conditions which, during the past year, had been onerous and difficult. One feature of the Committee work of the Institution—and one which in present circumstances was of great value—was the co-operation in many directions with Government Departments. This was particularly the case with the Codes of Practice Sub-Committee, the Gas Installations Committee, and the Co-Ordinating Committee of the Gas Engineering Advisory Boards. The last-named Committee had had most useful meetings with officials of the Ministry of Fuel and Power and, in addition to its normal work in saving coal and assisting undertakings in trouble, had been able to bring to the notice of the Ministry many of the difficulties under which they were working, such as shortage and unsuitability of coal and of labour. The Committee had recommended that in present circumstances the Gas Engineering Advisory Boards were of vital importance and that their work should continue; that recommendation had been approved by the Council.

Codes of Practice

Lt.-Col. F. J. Bywater, as Chairman of the Codes of Practice Sub-Committee, commented on the difference between the work of that Committee and the work of the Gas Installations Committee. In 1942 the Ministry of Works asked various technical institutions in the country to study and to prepare reports on the work in which they were particularly interested, the work required of them by the community. The electrical engineers, gas engineers, civil engineers, architects, structural engineers, and so on, were asked to present reports. The Institution of Gas Engineers appointed a Committee, at the invitation of the Minister, to deal with gas installations. That Committee sat under the Chairmanship of Mr. R. J. Rogers, and it would be agreed that it prepared a most excellent report; the popularity of the report was an indication of the value which the members of the Institution placed upon it.

The next step was for the Minister to appoint a Committee, under Sir Clement Hindley, which asked all the technical institutions to draw up Codes of Practice for the proper carrying on of the work with which they were concerned. The Institution appointed a Committee, again under Mr. Rogers, to draw up Codes of Practice for carrying out gas installation work. Unfortunately Mr. Rogers was not able to continue that work, and the Institution asked him, the speaker, to undertake it. They appointed a Sub-Committee, the members of which divided into seven Panels, and those Panels had drafted nine General Series Codes of Practice, which have been circulated by the British Standards Institution for comment all over the country. The comments had now been received and were being considered. It was hoped that within a few weeks the Codes of Practice dealing with gas installation pipes, gas service pipes, gas metering and consumers' control, space heating, flues for gas appliances, gas-cooking installations, gas lighting, hot water supply by gas, and the installation of gas-operated refrigerators would be available.

They had tried to do their job with two things in view—*i.e.*, simplicity, and the provision of good work combined with economy. The Code dealing with single family dwellings was almost ready for issue. They were now busy with the Code of Practice dealing with schools and large commercial buildings, and he hoped that that also would be finished by the early part of next year.

Standardization of Meters

Mr. J. T. Haynes (Chairman of the Meters Committee) spoke of the happy co-operation which had been achieved between the engineers and the contractors. That, he said, must of necessity redound to the benefit of the Industry as a whole, and he was very happy that both sides of the table were working so harmoniously together in connexion with gas meters.

One of their big problems, continued Mr. Haynes, had been that of standardization on the I.G.E. range of meters. Most of them agreed in principle that standardization was desirable, but owing to a number of factors there was not quite the same unanimity in the application of standardization. However, he was glad to say that the use of I.G.E. meters was increasing, and some of the older patterns of meter had now gone on to the scrap-heap so far as the manufacturers were concerned. One of the criticisms of the I.G.E. meter, the small high capacity meter in a standardized dimension case, was that it would have to have an increased number of revolutions per hour to pass a certain quantity of gas; therefore there would be greater wear and tear, and the life of the meter would be shortened. All the manufacturers were developing the mechanical side of their meters so that they were mechanically fitted to withstand the higher speed, so much so that suggestions had already been dealt with that the rating of the I.G.E. meters should be upgraded. He thought it was possible in the not too distant future that a meter, instead of being at 100 cu.ft., would be at 150 cu.ft., and engineers would feel a little more confident perhaps in installing I.G.E. meters.

A rather burning question was that of tariffs. They were often asked whether manufacturers could provide tariff mechanisms. He thought the best answer he could give was that, as soon as the Gas Industry itself made up its mind what it wanted to do in the way of tariffs, he was certain that the manufacturers had sufficient skill and ingenuity to design the necessary mechanisms. There were several mechanisms already available, some better than others; but until the Industry made up its mind what it wanted, he did not think it was fair to expect the manufacturers to make half-a-dozen of this and half-a-dozen of the other to suit particular managers' ideas.

Testing in Situ

With regard to the *in situ* testing of meters, they felt that, instead of leaving a meter in position for 10, 15, or 20 years, until somebody complained, it was better to test periodically. The details had not been worked out, because they had not the labour to enable them to do periodical testing; but he stressed that, as labour became available, engineers should undertake a system of regular periodic testing *in situ*, to satisfy themselves, in their own interests, that meters were registering satisfactorily. If any of the meters were not registering satisfactorily, they could be repaired and put back into service.

The problem of alternative materials for meter construction was one particularly for manufacturers rather than gas engineers; but it was being pursued very actively, and they had the assistance of the Gas Research Board in the matter. He was not in a position to say that any suitable alternatives had yet been found, but they could rest assured that the manufacturers and their representatives on the Meters Committee would do everything possible to ensure that the general quality and capacity of meters was improved as time went on.

Distribution Problems

Colonel W. Moncrieff Carr, O.B.E., T.D., said he would like to make a criticism in advance, in the hope that it might engender more work on the major problem of distribution. The work of the Chairmen's Technical Committee covered a good deal of ground; but there was an enormous amount of work to be done in regard to distribution. Which Committee would do it he did not know; whether the Pipes Committee was going to be extended to cover these distribution problems which were not now being dealt with by the Institution and which appeared to be nobody's business, but which were vital to the future of the Industry. Distribution systems had been built up in a haphazard way over many years, and there were very few distribution systems throughout the length and breadth of the country which were what they would desire to give the service essential in the future. It was only natural, of course, in an Industry which had grown up over more than a hundred years, and in which small systems had extended into very large systems, that the problem of achieving equality of pressure control, which was so vital to efficient gas service, throughout a mains system, was one which had been neglected.

He hoped the work of the Committees would be extended to include the consideration of, first, the problems arising in the reconstruction of the distribution system as a whole, and, secondly, the vital question of automatic pressure control throughout a distribution system to give equality of service to all consumers.

District Heating

This brought us to the 1st Report of the District Heating Committee.

Having examined published and unpublished information relating to district heating schemes, and made comparisons with alternative methods of heat distribution in the manner described in the body of the Report, the District Heating Committee has come to the following conclusions:

(1) That district heating is a practicable method of improving the utilization of fuel, and has considerable merits as a method of smoke abolition and coal economy.

(2) District heating combined with electricity supply is likely to be economically as well as technically satisfactory in districts where the density of low temperature heat demand is exceptionally high, but compares unfavourably with the use of gas or gas and coke in those areas of normal demand which represent the greater part of British towns.

(3) The interest which has been aroused in many quarters by the discussion of district heating indicates an increased desire for improved methods of fuel supply—a state of affairs which provides the Gas Industry with an opportunity to extend its service in the satisfaction of this desire.

(4) Seeing that the areas of exceptionally high density of heat demand are less numerous and less extensive than in some other countries, it would seem that the most favourable development of district heating would be on the lines of what has been called "zonal heating," which involves central-heating systems for blocks of buildings covering an appreciable area and in sufficiently large units to justify the raising of steam under pressure, and the expansion of this steam, with the production of electricity, before its use for the primary purpose of conveying heat.

Oxidation of Coal

The next item was the presentation by the Gas Research Fellow, Mr. R. E. Jones, of his Report, in collaboration with Professor D. T. A. Townend, for 1944–45 on the Mechanism of the Oxidation of Coal.

The Report describes the further development of research initiated in 1943 into the mechanism of the oxidation of coal. The previous Report (1943–44) drew attention to the importance of the part played by peroxidic bodies or active oxygen in the process; this has now been substantiated further by comparative investigations with both coal and carbon, which are shown to behave similarly.

The initial reaction appears to involve chemisorption, which, in the presence of water, is followed by the formation of a coal- or carbon-oxygen-water complex. The normal inherent water content of coals is a function of their internal surface; this is a minimum with coals containing *c.* 89% carbon. The peroxygen content of coals shows a similar variation with carbon content.

The peroxygen complex is unstable above approximately 70°C., a temperature long known to be critical in regard to spontaneous combustion of coal. Below it the complex is formed easily and remains relatively stable, little oxygen entering the coal substance; also the amount of ulmification remains very small. The small quantity of gaseous oxidation products consists chiefly of carbon monoxide with a less amount of CO_2. Above 70°C. the complex starts to break down, although with carbon it does not appear to be completely destroyed until 350°C. is reached. Oxidation above 70°C. is also marked by a big increase in the oxygen content of a coal, its general ulmification and in the yield of gaseous oxidation products; also carbon dioxide then preponderates over the monoxide. These observations were substantiated by means of gravimetric balances for the coal-oxygen reaction at 50° and 90°C. The pressure changes at these two temperatures were also different; whereas a gradual fall in pressure was recorded at 50°C., at 90°C. a temporary rise in pressure occurred. The remarkable difference in the behaviour above and below this critical temperature is common to both coal and carbon, and in view of the ability of carbon to form a carbon-oxygen-water complex, it is evident that with both materials the overall oxidation is controlled by the rate of breakdown of the complex. Of paramount importance is the necessity for the presence of water; indeed an explanation is now forthcoming of the classical experiments of C. J. Baker and H. B. Baker in 1887–88, which demonstrated that dry carbon cannot be readily oxidized even at red heat.

Flow States in Burner Streams

The final item on the Tuesday morning was a Paper on Flow States in Burner Streams by Dr. J. E. Garside and Mr. A. B. Whitehead.

The Paper embodies an account of a preliminary investigation into the flow states of gaseous streams; it forms a continuation of the work described in the Institution Gas Research Fellowship Report, 1942–43. A main purpose of the investigation is a more complete understanding of the mechanism of blow-off of burner flames.

It has already been established that aerodynamical factors appear to have no influence in conditioning the dead space between the base of the flame and the head of the burner—an important factor in controlling the light-back of aerated burner flames; dead space is, without doubt, attributable to the thermal gradient ahead of the flame.

It is now certain, however, that the phenomenon of blow-off involves other factors, including flow states, and the nature of the diffusion of the inflammable medium concerned into the surrounding atmosphere. The technique of instantaneous shadow photography, which is particularly suited to such an investigation, is being applied in an attempt to relate the flow states in gas streams with flame stability and injector action, in order to assist burner design.

The results so far obtained indicate that emergent gas streams behave in a characteristic manner, apparently following laws of flow similar to those governing the flow of confined fluids, and the transition from one type of flow to another appears to be related with the stability of an ignited stream.

The work will be extended to arrive at a complete analysis of the problem.

Removal of H_2S

On resumption of the meeting in the afternoon Mr. G. U. Hupton and Dr. R. H. Griffith presented their joint Paper on the Removal of Hydrogen Sulphide from Flue Gases. The following is a summary.

Of the seven known forms of ferric oxide, all except $\beta Fe_2O_3.H_2O$ react completely with H_2S to give the sulphide, $Fe_2S_3.H_2O$. This sulphide hydrate is readily oxidized to $\alpha Fe_2O_3.H_2O$ if conditions of pH temperature and moisture are satisfactory. Under acid conditions or at temperatures above 50°C. the sulphide decomposes into FeS_2 and a strongly magnetic sulphide, Fe_9S_8. Oxidation of these two sulphides takes place with very much more difficulty than does that of $Fe_2S_3.H_2O$, and the resulting oxide is not active for the absorption of more H_2S.

Dehydration of $Fe_2S_3.H_2O$ takes place at temperatures above 50°C., and the anhydrous sulphide is much more resistant to oxidation. The loss of water is more likely to occur when the sulphide is formed from an anhydrous oxide, and although rehydration of Fe_2S_3 can take place by addition of water, this change is slow.

The best performance for removal of H_2S from fuel gases is given by $\alpha Fe_2O_3.H_2O$ while $\gamma Fe_2O_3.H_2O$ is slightly less satisfactory. The inferior results with anhydrous oxides are due in some cases to the difficulty of preparing them in a sufficiently porous state, partly because they easily give the anhydrous sulphide, and partly owing to the fact that their reaction with H_2S is subject to an induction period, so that they are not suitable for the removal of traces of H_2S.

Porosity is essential to allow the penetration of H_2S through the layer of iron sulphide first formed; some of the natural or artificial forms of iron oxide are inferior on this account. Increase of apparent porosity by the addition of inert fibrous material does not improve a poor material, as the fine structure remains unaltered. The pore structure is also of great importance in the oxidation of hydrated ferric sulphide.

Oxidation of $Fe_2S_3.H_2O$ under proper conditions always gives $\alpha Fe_2O_3.H_2O$, an dit is possible for improvement in the performance of less satisfactory purifying materials to take place by this means after one or two cycles in use.

The Paper defines the molecular form of several natural and artificial purifying materials, and facts are discussed which explain the production of acid conditions in the box, that is, the mechanism of "souring" of purifiers.

Chemically-precipitated forms of iron oxide can be prepared in a state which is highly satisfactory both as regards pore structure and reactivity.

Presentation of Diplomas and Medals

Following submission of the 22nd Report of the Gas Education Committee, the President presented Diplomas in Gas Engineering (Manufacture) for 1945 to D. Beavis (Cambridge), 1st Class; A. J. Brandram (Swettenham), 2nd Class; R. H. Foston (Torquay), 2nd Class; H. W. Kenworthy (Sheffield), 2nd Class; L. G. Roberts, B.Sc.(Eng.) (Halifax), 2nd Class; and F. L. Robson (Stretford), 2nd Class.

Diplomas in Gas Engineering (Supply) for 1945 were presented to F. Harvey (Bilston), 1st Class, and F. B. Halliwell (Pasisley), 2nd Class; and the Charles Hunt Memorial Medals for 1945 to D. Beavis (Cambridge) and F. Harvey (Bilston).

Experimental Horizontal Chambers

The session closed with Mr. R. M. Farror's Paper on "An Experimental Setting of Horizontal Chambers."

This Paper describes an experimental chamber setting installed at the Wandsworth Works of the Wandsworth and District Gas Company. The plant was designed and erected for the purpose of examining the possibility of increasing the quantity of gas produced in the horizontal retort houses, while retaining existing foundations, buildings and ancillary plant. The coal throughputs per unit area of ground space for this and other types of carbonizing plant are compared. Constructional and operational details of the setting are criticized, and data relating to the carbonizing tests recently carried out are also given. The products of carbonization are examined, and are found to be similar both in characteristics and quantity to those obtained in good horizontal practice. It is established that the throughput of coal in the horizontal retort houses at Wandsworth could be substantially increased by the use of these chambers.

The Gas Research Board's Report

On resumption of the meeting on the Wednesday morning we had first the 6th Annual Report of the Council of the Gas Research Board, 1944–45.

The Report contains short statements of the progress made in each of the research programmes during the past year. It also includes accounts of certain other researches of direct interest, such as, for example, the work on methane synthesis at the Fuel Research Station, and the work of the Research Fellows of the Institution of Gas Engineers.

The research work has been carried out at the University of Leeds and at Bournemouth under the Joint Research Committee, and at

South Kensington under the Committee on Gas Utilization. For the work of the Joint Research Committee facilities have been provided in the works of the Leeds, Birmingham and Manchester Corporation Gas Departments and of Liverpool Gas Company, in connexion with the survey of the combustion characteristics of town gas. At Bournemouth, the facilities already provided for the intermediate-scale work on the gasification of coal in hydrogen have been extended to include work on a similar scale on the synthesis of methane from carbon monoxide and hydrogen, and apparatus for this purpose has been in course of erection during the year. In addition, a further programme has been planned, involving the use of one of the Company's small water-gas plants in order to investigate the effect of preheating air and steam in water-gas production.

The second main branch of the work records the start of several new investigations in the field of gas utilization at South Kensington and in the laboratories of two undertakings. The interest shown by member firms of the Society of British Gas Industries has been most stimulating, and a number of suggestions for research and development have passed between the technical staffs of companies manufacturing appliances and the staff of the Board.

It has not yet been possible to start work on the programmes for which the Sub-Committee on Coke will be responsible, but a preliminary plan of work has been drawn up for action when possible. An arrangement has been made with Imperial Chemical Industries, Ltd., for collaborative experiments upon the preparation of activated domestic coke.

Dr. Dent, as Joint Assistant Director, has supervised the work of the research group at the University of Leeds, and has given special attention to the pressure gasification experiments conducted by Dr. Blackburn at Bournemouth. Mr. Wood has continued to conduct the surveys of the combustion characteristics of town gas and of the distribution of organic sulphur compounds in town gas. The loss of Dr. Key during the year has made necessary certain changes in the responsibilities of the staff. Dr. Eastwood and Dr. Moignard were promoted to the rank of research chemist, and placed in charge of the programmes of purification of gases from organic sulphur compounds and of methane synthesis respectively. Dr. Eastwood also took over the technical work of the Liquor Effluents and Ammonia Committee of the Institution of Gas Engineers, and two research programmes being carried out under that Committee.

The studies of the emission and absorption of radiation in the infra-red conducted by Mr. Long have continued, supervised by Dr. A. L. Roberts, of the staff of the University of Leeds. Professor M. G. Evans has supervised the investigations of a post-graduate research assistant into the mechanism of the deposition of carbon in the reactions involved in the synthesis of methane. Professor Townend, the Livesey Professor, has given valuable help in the work conducted under the Joint Research Committee, and particularly in his general supervision of the research work conducted in his Department in the University.

At South Kensington Dr. Booth has organized the adaptation of laboratory space, and has made a start with six research programmes concerned with the utilization of town gas. Dr. Hall has continued to work in the Department of Professor Sir Alfred Egerton on problems associated with the liquefaction of gases, and Mr. Haselden, who joined the staff during the year, is working with him.

The research programmes on refractories for use in the Gas Industry have been conducted by the British Refractories Research Association under its Director, Mr. A. T. Green, at the Mellor Laboratories, Stoke-on-Trent, and in individual works. One programme, the quantitative evaluation of quartzite, involves an investigation at the University of Leeds, which is being conducted under the supervision of Dr. A. L. Roberts.

Radiant Heating

Then we had the first report on Radiant Heating—the 46th Report of the Joint Research Committee of the Gas Research Board and the University of Leeds—by Dr. A. L. Roberts and Mr. R. Long.

The work described in the Report was primarily directed towards a study of the mechanism of heating by radiation, with the particular object of establishing whether the quality (*i.e.*, the distribution of the radiant energy with respect to wave-length) of the radiation used was of significance in industrial processes in general. This question is of especial importance to the Gas Industry, (*a*) because the radiation emitted by most gas-heated sources is essentially of longer wave-lengths than that from electric tungsten-filament lamp units, the difference being largely due to the higher operating temperature of the latter, and (*b*) because in certain industrial processes, such as the drying of paints by radiant heating, claims have been made that the use of short-wave radiation is advantageous.

An introduction deals with the basic principles of the utilization of radiant energy for heating purposes, and shows the fundamental differences between radiation and convection methods. The dependence of both quantity and quality of the radiation on the temperature and nature of the emitting source is considered, with special reference to materials which radiate selectively—*i.e.*, whose emission, relative to that of a black body at the same temperature, varies at different wave-lengths.

The infra-red spectrometer used in this work, and the technique of determining emission and absorption characteristics of various industrial materials, are described.

The results are given of a preliminary and general survey of the emission characteristics of typical refractory materials from which the radiating surfaces of high temperature gas-heated units are usually made. It is shown that materials of this type are selective radiators, their emission over relatively short wavelengths being considerably less than that from an ideal radiator (black body) at the same temperature. Some increase in short wave emission was obtained by adding small proportions of coloured oxides to the parent materials, but the effects observed up to the present are relatively small, and are probably of little practical importance in so far as the enhanced emission in the shorter wave-lengths is concerned.

In tests designed to simulate practical conditions, however, comparative emission measurements were made when the thermal input was the same. In this case the total emission from the materials of low emissivity approached that of the black body, but the temperature attained was far higher. It appears that the total rate of emission of radiant energy from a gas-heated unit employing heated refractory surfaces may not be much less than if the surface had black-body characteristics. The thermal efficiency of the unit may be lower, however, since the rate of effective heat transfer from the products of combustion to the radiating surface depends on the temperature of the latter. From this point of view the emission properties of the refractory surface should approach those of a black body as nearly as possible, and it is mainly as a means to this end that additives may be of importance.

The results are set out of a study of the transmission characteristics of representative stoving enamels. In general, the paints showed relatively little transmission at short wave-lengths (*e.g.* those in which the bulk of the radiant energy from the tungsten-filament lamp is situated); at higher wave-lengths all the paints showed considerable transmission. Except in one or two cases there was no evidence that short wave-length radiation substantially penetrates the paint film; simultaneous penetration and absorption is the general rule. In most cases it appeared that the wave-length of the incident radiation used is of little significance in the paint-drying process. In special circumstances, however, this generalization may not apply; for example, when the paint film itself is appreciably reflecting, or when the metal surface on which the paint is applied is a substantial reflector of radiation and the paint or lacquer has high transmission characteristics.

The mechanism of the radiant-heating process, with particular reference to its limitations, is dealt with generally. As the majority of industrial materials are largely opaque to radiation, the incident energy is absorbed on or very near the surface, which thereby becomes rapidly heated. The rate at which the interior of the material is then heated depends upon its thermal characteristics.

When an opaque material is liable to spoil at relatively low temperatures, radiant heating then may offer little, if any, advantage over convection methods as regards speed. Certain important industrial materials (*e.g.*, plastics) were found to transmit short-wave radiation appreciably. The transmission data indicated that longer-wave radiation was preferable for softening such materials by radiant heating—a conclusion which is in accord with practical experience.

Organic Sulphur Compounds in Town Gas

Next came discussion on the 48th Report of the Joint Research Committee of the Gas Research Board and University of Leeds—"A Survey of the Distribution of Organic Sulphur Compounds in Town Gas," by Mr. J. W. Wood and Dr. E. W. Claydon. Followed the 45th Report of the Joint Research Committee of the Gas Research Board and University of Leeds. "The Removal of Sulphur Compounds from Coal Gas and Synthesis Gas," by Dr. A. Key and Dr. A. H. Eastwood. This concluded Wednesday morning's session.

The Final Session

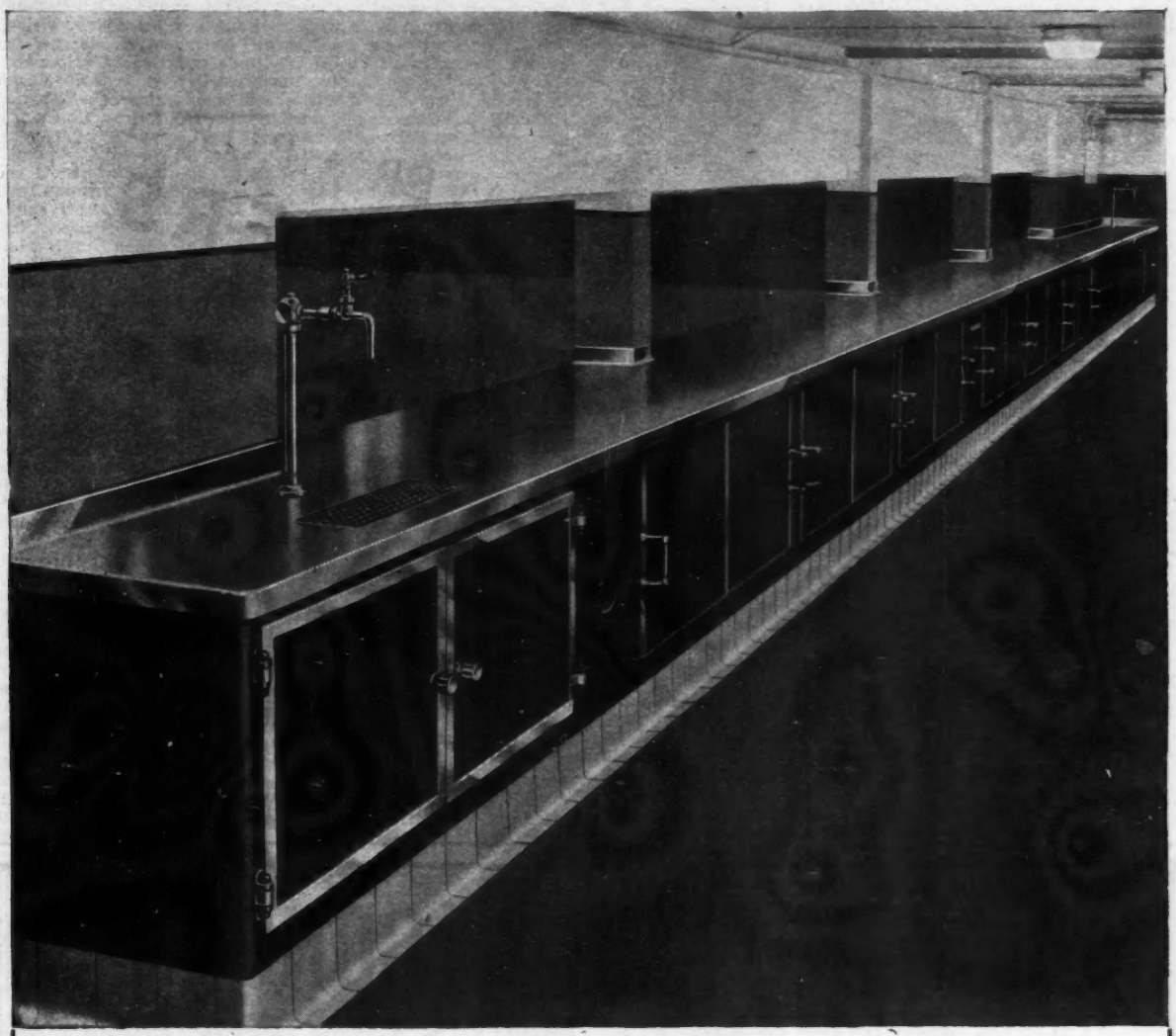
First on the programme on the final session of the meeting on Wednesday afternoon was the 36th Report of the Refractory Materials Joint Committee, which was followed by (*a*) the 49th Report of the Joint Research Committee of the Gas Research Board and University of Leeds. "The Synthesis of Methane from Carbon Monoxide and Hydrogen," by Dr. F. J. Dent, Dr. L. A. Moignard, Dr. A. H. Eastwood, Dr. W. H. Blackburn, and Dr. D. Hebden. (*b*) A Paper on "Catalytic Synthesis of Methane" (Experimental work at the Fuel Research Station), by Dr. N. Booth, Dr. E. T. Wilkins, Dr. L. J. Jolley, and Dr. J. A. Tebboth, brought us to the 47th Report of the Joint Research Committee of the Gas Research Board and University of Leeds. "A Survey of the Combustion Characteristics of Town Gas," by Mr. J. W. Wood and Dr. E. W. Claydon.

New Members

Thereafter came announcement of new members of the Institution, as follows:

Honorary Membership.—The Presidents (*ex officio*) of the Gas Associations of Denmark, the Netherlands, Norway, Sweden and Switzerland. Forward, A. (formerly Managing Director, American Gas Association).

Membership.—Baird, D., B.Sc. (Research Chemist, Glasgow Corporation Gas Department), Burns, J., B.Sc., Ph.D. (Station Engineer, Gas Light and Coke Company), Cooper, J. E., B.Sc. (Section



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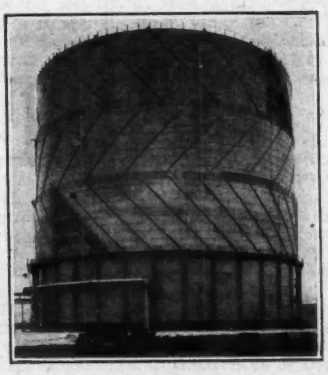

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Leader, Gas Light and Coke Company), Greenwood, H. D., M.Sc. (Controller [Gas Services], Fuel, Power and Public Utilities Branch, Control Commission for Germany); Riley, C. H. (Engineer, Manager and Secretary, Penistone and District Gas Company).

Associate Membership.—Aird, A. (First-Class Chemist, Provan Works, Glasgow Gas Department), Armstrong, W. R. (Assistant Carbonizing Superintendent, Belfast Gas Department); Bolton, K., B.Sc. (Assistant Gas Engineer, Oldbury Gas Department), Bradford, H. W., B.Sc. (Assistant Works Engineer, Tottenham and District Gas Company), Bromley, H. (Assistant Distribution Engineer, Stockport Gas Department), Brook, C. V. W. (Assistant Engineer, Shanghai Gas Company, Ltd.), Butler, C. W. (Distribution Superintendent, Rhyl Urban District Council Gas and Water Department), Cashmore, G. E. (Laboratory Chemist, Birmingham Gas Department), Chapman, H. E., B.Sc. (Chemist, Birmingham Gas Department), Collieson, A. F. (Chief Assistant Engineer, County Borough of Wallasey Gas and Water Department), Cox, F. G. (Technical Distribution Assistant, Nottingham Gas Department), Crathorn, S. C., B.Sc., A.R.I.C. (Assistant Retort House Superintendent, Birmingham Gas Department), Gallaher, P. E. (Assistant Retort House Superintendent, Birmingham Gas Department), Hall, A. A., B.A. (Divisional Mains Superintendent, Gas Light and Coke Company), Hickin, S. W., Assoc.M.Inst.C.E. (Junior Engineer, Birmingham Gas Department), Hornby, N. (Assistant Manager, Hessle Gas Company), King, W. G. (Control Chemist, South Metropolitan Gas Company), Knowles, R. G. (Carbonizing Superintendent, Stockport Gas Department), Lenthall, A. E. (Carbonizing Engineer, W. J. Jenkins and Company, Ltd.), Millner, H., B.Sc. (Assistant Engineer and Manager, Scarborough Gas Company), Painter, F. J. (Chief Chemist and Technical Assistant, Doncaster Gas Department), Parsons, W. J. (Water Heating Supervisor, Birmingham Gas Department), Phairn, W. (Engineer and Manager, Royal Burgh of Lanark Gas Department), Reed, F. G. (Senior Assistant, Ministry of Fuel and Power), Stephen, A. W. (Technical Assistant, Aberdeen Gas Department), Townsend, L. G., M.Sc., A.R.I.C. (Station Chief Chemist, Linacre Works, Liverpool Gas Company), Vigus K. W. (Assistant Chemist and Relief Shift Superintendent, Dudley, Brierley Hill and District Gas Company), White, R. E. (Assistant Works Manager, Leeds Gas Department), Wickstead, N. (Junior Chemist and Relief Shift Superintendent, Dudley, Brierley Hill and District Gas Company), Witcombe, H. F. (Assistant Gas Engineer, Basingstoke Gas Company).

Associateship.—Kernon, D. R. (Chief Engineer, Chemical Engineering and Wilton's Patent Furnace Company, Ltd.), Taylor, J. H. Managing Director, Gas Purification and Chemical Company, Ltd.), Tiplady, G., M.Sc. (Inspector of Alkali Works, Ministry of Health), Wilton, N. (Joint Managing Director, Chemical Engineering and Wilton's Patent Furnace Company, Ltd.).

Omnibus Vote of Thanks

The meeting concluded by an omnibus vote of thanks proposed by Dr. E. W. Smith and seconded by Mr. R. L. Greaves to the Gas Research Board, the University of Leeds, the Livesey Professor, the Director, Assistant Director, and Staff of the Gas Research Board, the Institution of Mechanical Engineers, the Authors of Reports and Papers, undertakings, organizations, and gentlemen conducting education or technical or research work for the Institution or the Gas Research Board, the Chairmen and members of the Gas Education Committees, the Board of Examiners, and the Technical and Research Committees of the Institution and the Gas Research Board, the Scrutineers of the Ballot, the Secretary and Staff of the Institution, and, finally, the Chairman.

THE RESEARCH LUNCHEON

Following Tuesday morning's proceedings of the Institution of Gas Engineers, the members and a distinguished company of guests gathered for luncheon at the Savoy Hotel, London. The President (Colonel Croft) presided.

The **President** proposed "The Guests," and voiced the Institution's pride in entertaining so many guests of very diverse occupations. He welcomed especially the Rt. Hon. John Wilmot, M.P. (Minister of Supply and Aircraft Production), and the Rt. Hon. Lord Hyndley. Their guests included public men of ability and who had rendered great service. there were guests representative of the scientific institutions, the Houses of legislation, and many Government Departments and research institutions. The Institution was delighted to welcome among them Sir Charles Darwin, the Director of the National Physical Laboratory. There were representatives of London University, Leeds University, the Imperial College of Science, and they included the Professor of Organic Chemistry at the London University. There were also the Presidents of the Institution of Civil Engineers, the Institution of Electrical Engineers, the Royal Institute of Chemistry, the Society of Chemical Industry, the Institution of Water Engineers, the Institute of Fuel, the Institution of Municipal and County Engineers, the Institution of Chemical Engineers, the Illuminating Engineering Society, the Coke Oven Managers' Association, the British Commercial Gas Association, and the London and Counties Coke Association. Further, it was pleasing to welcome Sir Pearson Frank, Chief Engineer, London County Council, and President of the Institution of Civil Engineers. Again, the presence of Mr. Frank H. Jones, the Chairman of the Wandsworth and District Gas Company, afforded the President the first public opportunity he had had of saying how much he appreciated the kindness of the Directors of the Company in giving him facilities for performing the duties of President of the Institution.

It seemed a pity, but was an obvious fact, that the great impetus to research should be some form of calamity such as war; research became a necessity in war, in connexion with restoring the health of those who had suffered, in connexion with the problem of annihilating their enemies, and so on. Gas research was of great importance in war; but it had much to do also with their everyday lives in the home. It would enable the Industry to improve its service to the nation, by providing everything that was extractable from coal and of use to man, by providing, not only their homes, but industry generally, with efficient, economical, and smokeless forms of fuel.

The **Rt. Hon. John Wilmot, M.P.** (Minister of Supply and Aircraft Production), in his response to the toast, said the Minister of Supply as such was not concerned with the broad questions of gas policy. He was interested primarily in gas engineering, gas research, and gas affairs, apart from his natural interest in such matters as a Member of Parliament, and he was primarily interested as a very big consumer of industrial gas. The Ministry of Supply carried the primary Government responsibility over the whole field of engineering, and the engineering industry and the Ministry's own factories were very large consumers of gas for industrial purposes. The Ministry was vitally interested in the proper use of gas.

Vital Part Played by Gas

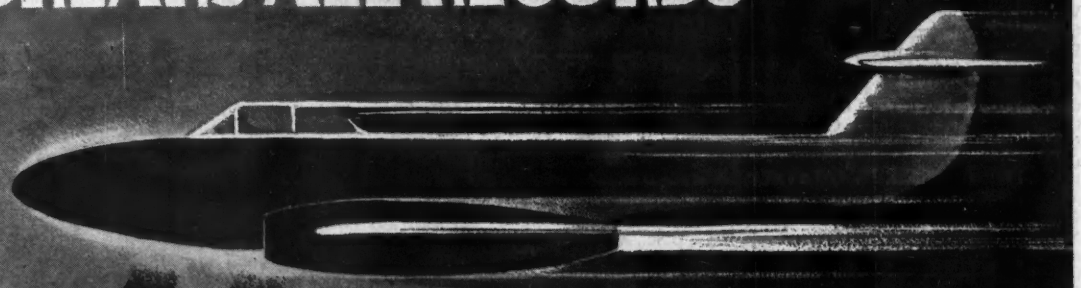
Having had the honour, during part of the war period, of being a Parliamentary Secretary, the vital part which gas was playing in the war industry, particularly in the munitions industry, had brought him closely into association with gas engineers and their work. Therefore, he was anxious to pay his tribute, and that of his Ministry, to the work they had done during the war, and which, he believed, had not been fully appreciated by a wider public. Those who knew the facts would appreciate to the full the really remarkable achievements of the Gas Industry and of gas engineers under the peculiar wartime conditions. Gas was a versatile fuel, and it was vulnerable to attack from the air. The Gas Industry's blitz difficulties, he supposed, were as great as anybody's. The gasholder was a particularly vulnerable point in the Gas Industry's wartime mechanism. But the gas engineers had met the difficulty. They had invented and had laid on an astonishing system of gas inter-communications; and he did not think the wider public realized what they owed to that forethought and ingenuity. There was inter-communication not only between the various points of a single undertaking, but also between the mains of different undertakings, so that one undertaking which was stricken could call upon its neighbours for immediate aid.

As a result of those forward-looking arrangements, the collapse of their industrial organization from that cause was averted. Supplies of gas were maintained for industrial purposes under the severest possible tests. But it was not only in London that that remarkable job had been done. One of the astounding achievements of gas engineers, and one which would for long shine in the memories of the Ministries of Supply and of Aircraft Production, was that at Coventry during the blitz in November, 1940, and April, 1941. Coventry was a vital centre of aircraft and engine production. It had depended on gas, and the repair service which was mobilized had laid on a supply to that stricken city in an incredibly short time. Giving two further examples of the good work of the Gas Industry, Mr. Wilmot said that not only had the Industry provided in advance the alternative systems of supply, but it had provided for mobilization from all over the country if need be. More than a hundred men were pulled in from London alone to assist in effecting the Coventry repairs. The Industry had also assisted the Government to prepare completely independent and alternative producer gas plants on the spot. The Ministry had played a very large part, with the help of the Gas Industry, in producing units for the independent production of gas where normal supplies were interrupted. He took the opportunity of thanking the gas engineers especially for their part in the construction of the independent producer gas plants, which had enabled their producing units to keep going when every other kind of assistance had failed. The gas engineers had been concerned not only with the production of the plant, but with the training of the people in the use of it.

Sir Charles Darwin, K.B.E., M.C., M.A., Sc.D., F.R.S. (Director, National Physical Laboratory, Department of Scientific and Industrial Research), who proposed "The Institution of Gas Engineers," said that, inasmuch as he knew something about atomic energy, perhaps the gas engineers had wanted to know in advance whether or not they were shortly to be put out of business. He did not propose to talk about atomic energy; but he was a shareholder in a gas undertaking, and he did not propose for some time to write to his broker to give instructions to sell his shares! Commenting that everybody was urging the great importance of research, and that certainly he would do so as strongly as anyone else, Sir Charles said he had sometimes a feeling that the method by which it was presented was a little injudicious, on the principle that there were enormous plums in research, and that any body which did research would gain those enormous plums. But that was the wrong way in which to look at the problem. Research was essentially speculative; it involved the employment of very highly paid staffs, but it did produce quite unexpected benefits.

Mr. G. C. Pearson, M.Inst.C.E. (Vice-President of the Institution),

BREAKS ALL RECORDS



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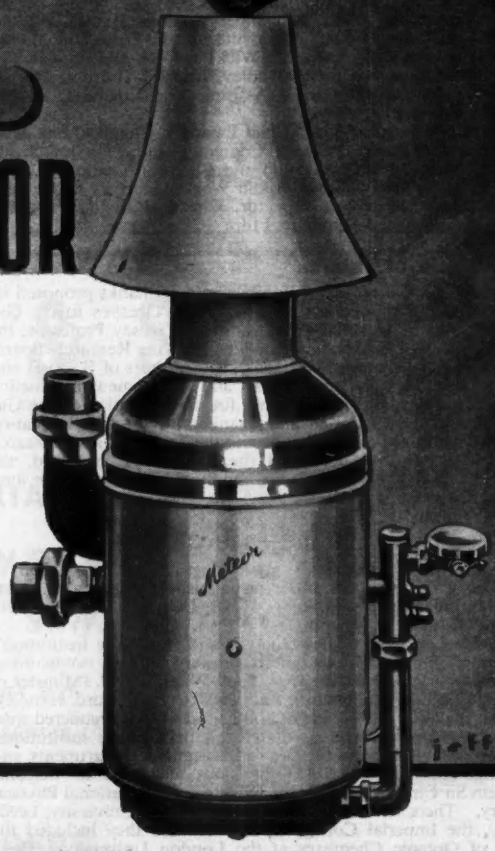

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who responded, said it was difficult to separate the Industry from the Institution, so that he would follow tradition by speaking of them both together. Commenting on some of the Institution's work, he recalled the very fine Memorandum which went out during 1938 on A.R.P., and said the Institution's Committees which were formed at that time had been very helpful to the undertakings and the engineers in arranging organized assistance in case of breakdown. The Institution could be satisfied that by reason of its research work it was still giving help. It had rendered important service by arranging a system of training, whereby gas engineers were trained to make the best use of fuel, for coal carbonization was the most economical way of using the resources of the nation. As to co-operation with the Government, he said the Industry was prepared to operate the schemes that Parliament might devise for the reconstruction of the country, and to do its best to carry out the wishes of the Government.

Mr. Frank H. Jones (Chairman, Wandsworth and District Gas Company) proposed the health of the President, Colonel Croft. He recalled that, 35 years or more ago, Colonel Croft was a pupil of himself and his father, and he had proved a very good pupil.

The **President** in a brief response, said he was glad of the opportunity to acknowledge that both Mr. Jones and his father had been excellent chiefs, and that he had enjoyed every day he had worked with them. He expressed his thanks for the kindness they had extended to him.

Removal of Hydrogen Sulphide from Fuel Gases*

By G. U. HOPTON, B.A., B.Sc., A.M.I.Chem.E., and R. H. GRIFFITH, B.A., D.Phil.

ONE of the longest established methods of purification of fuel gases is that in which hydrogen sulphide is removed by means of iron oxide. The treatment is highly efficient, and concentrations of hydrogen sulphide below 1 part in 10 mill. can be reached. There still remain, however, certain features of the process which are difficult to explain, and some disadvantages in ground-space requirements and handling charges.

For these reasons, the reactions involved have been newly investigated with two objectives; firstly, to determine which form of iron oxide is most suitable, and secondly, to attempt to improve the speed of the reaction with a consequent reduction in the size of plant.

An extensive study of the reaction of hydrogen sulphide with amorphous ferric oxide was carried out in 1928 by T. G. Pearson and P. L. Robinson,† who identified the iron sulphides produced.

It has subsequently been recognized that ferric oxide can exist in a large number of different molecular forms, some of which occur in natural ores while others are produced as industrial by-products. Each form, except the amorphous, has a characteristic crystal structure. The present investigation was undertaken in order to study the behaviour of seven molecular forms of ferric oxide as purifying agents for the removal of hydrogen sulphide from coal gas, and to identify the components of purifying materials used in the Gas Industry. Detailed work on the reaction of these seven oxides with hydrogen sulphide and on the oxidation of the resulting sulphides is described in other publications from this laboratory.‡

Forms of Iron Oxide

Table I shows the oxides which have been used, together with the methods employed in their preparation and references to the original literature; many of these are described also by Abegg.§

TABLE I.—FORMS OF IRON OXIDE EXAMINED.

Oxide.	Source.	Literature Reference.
αFe_2O_3	Dehydration of $\alpha Fe_2O_3.H_2O$ at 300°C.	Abegg, *Handbuch*.
$\alpha Fe_2O_3.H_2O$	Atmospheric oxidation of ferrous carbonate.	*Ber.*, 1929, **62**, 1475.
$\beta Fe_2O_3.H_2O$	Hydrolysis of $FeCl_3$ solution.	*J. Amer. Chem. Soc.*, 1935, **57**, 238.
γFe_2O_3	Atmospheric oxidation of precipitated Fe_3O_4.	*Phil. Mag.*, 1925, **50**, 399.
$\gamma Fe_2O_3.H_2O$	Atmospheric oxidation of ferrous pyridyl chloride solution.	*J. Amer. Chem. Soc.*, 1932, **54**, 943.
$\delta Fe_2O_3.H_2O$	Oxidation of ferrous hydroxide by strongly alkaline H_2O_2.	*Z. anorg. Chem.*, 1939, **240**, 161.
Amorphous Fe_2O_3	Precipitation of ferric salt solution by alkali hydroxide or ammonia.	*J. Physical Chem.*, 1935, **39**, 25.

Table II summarizes the outstanding physical properties of these oxides.

TABLE II.—CHARACTERISTIC PHYSICAL PROPERTIES OF THE SEVEN FORMS OF FERRIC OXIDE.

αFe_2O_3	Bright red, with low magnetic susceptibility; very stable on heating.
$\alpha Fe_2O_3.H_2O$	Yellow-brown, with low susceptibility. Changes to αFe_2O_3 on heating at 250 to 300°C.
$\beta Fe_2O_3.H_2O$	Bright yellow, with low susceptibility. Changes to αFe_2O_3 on heating above 100°C.
γFe_2O_3	Chocolate brown; intensely magnetic. On heating at 300°C. changes to αFe_2O_3 with loss of magnetic properties, the conversion being complete in about 24 hours.
$\gamma Fe_2O_3.H_2O$	Orange, with low susceptibility. On heating at 300°C. changes to γFe_2O_3 with great increase in magnetic properties, but on prolonged heating at this temperature slowly converted to αFe_2O_3 with a fall of susceptibility as for γFe_2O_3.
Amorphous Fe_2O_3	Red-brown, low susceptibility hardly changed on heating; at 100°C. becomes αFe_2O_3 even under boiling water, when colour becomes bright red.
$\delta Fe_2O_3.H_2O$	Dark red-brown, intensely magnetic. On heating at 150°C., is converted completely to αFe_2O_3 with a great fall in susceptibility.

* Institution of Gas Engineers Communication No. 288.
† *J.C.S.*, 1928, 814.
‡ *J.C.S.*, publication pending.
§ *Handbuch der Anorganischen Chemie*, 4, Abt. 3, Teil 2, Lief. 1, pp. 259B-278B, 238B-239B.

Solubility in Acid.

The rate of solution of the oxides in dilute hydrochloric acids depends greatly on their structure. Of the hydrated forms, the amorphous oxide is far the most readily soluble, while of the anhydrous materials the α-oxide dissolves most rapidly.

Identification of Natural and Commercial Materials.

The identification of unknown grades of iron oxide can be carried out by combination of two methods:

(i) Measurement of the change in magnetic properties on heating.
(ii) Determination of the rate of solution in acid under standardized conditions.

Reference to the principles involved has already been made in Table II, &c., and full particulars are described elsewhere.*

Materials Available for Practical Use.

(a) *Natural Ores.*

The most favoured material in this class has long been bog ore. Examination by the present methods shows that it consists of a mixture of amorphous ferric oxide and $\gamma Fe_2O_3.H_2O$, together with some α–oxide or α–hydrate and inorganic and organic impurities. As will be shown later, it is by no means ideal from the chemical viewpoint and its tendency to develop acid conditions is an additional drawback, but this can be prevented by addition of alkali. The fact that bog ore improves after some use is interesting, and may be explained by the fact that the relatively inert amorphous oxide will change slowly to sulphide, and that when this re-oxidizes it appears as $\alpha Fe_2O_3.H_2O$, which is shown in this work to have a higher rate of reaction with hydrogen sulphide.

Some natural sources of $\alpha Fe_2O_3.H_2O$, such as goethite, may be unsuitable for use in conventional purifier boxes, owing to their physical condition.

(b) *Corrosion of Steel.*

Under acid conditions when steel scrap easily corrodes, the product consists of a mixture of $\gamma Fe_2O_3.H_2O$ and γFe_2O_3. The latter results from oxidation of Fe_3O_4, which is first formed; it confers strong magnetic properties on the mixture. It does not appear likely that any material formed in this way will initially compare favourably with the precipitated oxides on account of its high density, but this oxide should improve somewhat with use in the same way as bog ore.

(c) *Precipitated Oxides.*

The precipitation of a solution of ferric salt by alkali hydroxide or ammonia always leads to the formation of amorphous ferric oxide, and is therefore unsuitable for the present purpose. It is possible to prepare $\alpha Fe_2O_3.H_2O$ from ferric-salt solutions by hydrolysis, but the oxide generally appears in a very finely-divided state which is extremely difficult to wash and to handle.

It is much to be preferred to precipitate ferrous-salt solutions in the form of ferrous carbonate and to allow this to oxidize in the solid state by contact with air. Under these conditions, $\alpha Fe_2O_3.H_2O$ is obtained with very satisfactory properties. If the precipitation is carried out with alkali hydroxide or ammonia, the ferrous hydroxide which is produced reacts with ferric oxide formed by oxidation and leads to the appearance of black magnetic oxide. An extensive study of this process has been made by C. Sandonnini† and by A. Quartaroli.‡ The magnetic oxide in turn oxidizes further, but the result is γFe_2O_3 and not a hydrated oxide. It is possible, however, to prepare an active mixture containing $\alpha Fe_2O_3.H_2O$ by mixing dry lime or soda-ash with $FeSO_4.7H_2O$ and adding just enough water to initiate the reaction: under these conditions Fe_3O_4 is not produced. The formation of special purifying materials by such methods has been practised

* *J.C.S.*, publication pending.
† *Gazzta*, 1930, **60**, 321.
‡ *Ibid.*, 1933, **63**, 669.

for many years, but has generally been too expensive for standard application. It is, however, of great value in increasing the activity of material of poor quality. $\alpha Fe_2O_3.H_2O$ is also prepared by hydrolysis of sodium ferrite, which is produced in fusion of bauxite with caustic alkali by the Deville-Péchiney process. It has appreciable magnetic properties, due to the presence of traces of γFe_2O_3; this occurs again from oxidation of Fe_3O_4 formed by the reducing action of organic matter during the fusion. It contains alumina and titanium oxide as inert diluents.

Factors Affecting the Interaction of Hydrogen Sulphide and Ferric Oxide.

From detailed study of the reaction of individual forms of ferric oxide with H_2S, and of the oxidation of iron sulphides, which is being published elsewhere,* several other important facts may be summarized briefly as follows:

1. The first product of the action of H_2S on any ferric oxide is Fe_2S_3, usually in hydrated form. Under acid conditions this sulphide decomposes rapidly to FeS_2 and Fe_3S_4; the former will not re-oxidize to ferric oxide but only to sulphate, while the latter oxidizes much more slowly than does Fe_2S_3.
2. The rate of reaction of ferric oxides with H_2S depends chiefly on the penetration of H_2S through the material, and is therefore related to the porosity. Anhydrous ferric oxides, however, show an induction period in the reaction, so that their conversion to sulphide is initially much slower than that of the hydrated forms. The amorphous oxide hydrate is very unreactive owing to rapid volume changes, which lead to closing of the pore structure, when the sulphide is formed from it.
3. The sulphide $Fe_2S_3.H_2O$, when oxidized under proper control, always gives $\alpha Fe_2O_3.H_2O$. Any form of iron oxide which initially reacts with H_2S, even if very slowly, will therefore finish as $\alpha Fe_2O_3.H_2O$ after one complete cycle. An anhydrous or amorphous ferric oxide can thus improve in performance when it has been at work for some time.
4. Only the hydrated sulphide will oxidize smoothly to give active $\alpha Fe_2O_3.H_2O$. Dehydration takes place easily at temperatures above about 40°C., and the anhydrous sulphide is somewhat more likely to be formed from an anhydrous oxide than it is from one which is hydrated.
5. Oxidation of $Fe_2S_3.H_2O$ at room temperature is slower than the rate of reaction of H_2S with hydrated ferric oxides; the heat of reaction is, however, much greater, and if the temperature is not controlled extensive dehydration of the sulphide, not yet oxidized, will take place. When this anhydrous sulphide is oxidized, it will produce iron sulphate and some anhydrous γFe_2O_3, so that the regenerated oxide is of poor quality. The rate of oxidation of the hydrated sulphide depends greatly on the pore structure.
6. The inactivity of burnt oxide is due to the fact that it has been heated to a high temperature, with resulting sintering of the surface. A deterioration in the reactivity of αFe_2O_3 with H_2S begins to appear when it has been heated above 600°C.

In view of these facts, it was evident that improvements in the iron oxide process would result from careful selection of the material used, and from its preparation in a porous granular form. This would ensure uniform flow of gas through the purifier, together with exposure to a large surface of high activity under conditions of minimum back-pressure. Several methods have been described by which iron oxide has been shaped into roughly spherical pieces and held together by some binding agent. Reagents prepared in this way, however, have proved relatively unreactive and contain much inert material, so that an alternative was sought. During the subsequent stages of this work, two methods have been employed to prepare granular iron oxide.

The first of these makes use of calcium sulphate as a binding agent, and at the same time prepares $\alpha Fe_2O_3.H_2O$ in a suitable form by carrying out the reactions:

$$FeSO_4.7H_2O + Ca(OH)_2 \rightarrow Fe(OH)_3 + CaSO_4.2H_2O + 5H_2O$$

followed by oxidation of the ferrous hydroxide to hydrated ferric oxide.† (B.P. 567,231.)

The second depends upon pressure alone to form the iron oxide into tablets of convenient shape and usually ⅜ in. diameter; no binding agent is employed, and the contact material consists solely of iron oxide prepared at a pressure of about 500 to 1,000 atm.‡

To compare the behaviour of purifying agents made in these ways, a small-scale test apparatus was set up in the laboratory, and some of the results obtained by this means are recorded below.

Determination of the Activity of Iron Oxide

Methods of Test as Purifying Agent.

All the oxides were made into tablets, by use of a machine. They were ⅜ in. in diameter, with convex ends and a maximum thickness of $\frac{3}{16}$ in. The feed to the machine was graded to pass 18-mesh and stay on 60-mesh sieve; the free water content was 10 to 12%. Except in samples where the pH is recorded as being below 7.5, the iron oxide was always treated with 1% Na_2CO_3 solution before being graded. Tablets made in this way are highly porous, and more suitable (on account of their uniformity) for comparative experiments than are coarse powders or broken cakes. They also provide conditions for gas flow almost identical with those given by perfect spheres.

The tablets were packed into a glass tube of 1¼ in. internal diameter to a depth of 12 in., occupying a space of 250 c.c., and coal gas, containing 450 to 500 gr. of H_2S per 100 cu.ft., was passed through the column at 10 cu.ft. per hr. This gave a space velocity of about 1,100 volumes of gas per hour per unit volume of oxide, which is at least 100 times as high as in conventional gas-works practice. The concentration of H_2S in the outlet gas was determined at frequent intervals either by a lead acetate paper disk test,† or for the higher amounts by ammoniacal zinc acetate solution. The oxygen content of the ingoing gas was 1.2%.

The results are given in Tables III and IV, and are plotted in the form of curves, as shown in fig. 1; most of the lines have a characteristic break point at which the concentration of the outlet H_2S suddenly increases. The time in minutes from the start at which this occurs is recorded as the break point in the tables of results, together with the slope of the line beyond this point. The slope is expressed as the increase, in parts per million, in H_2S concentration in 50 min.

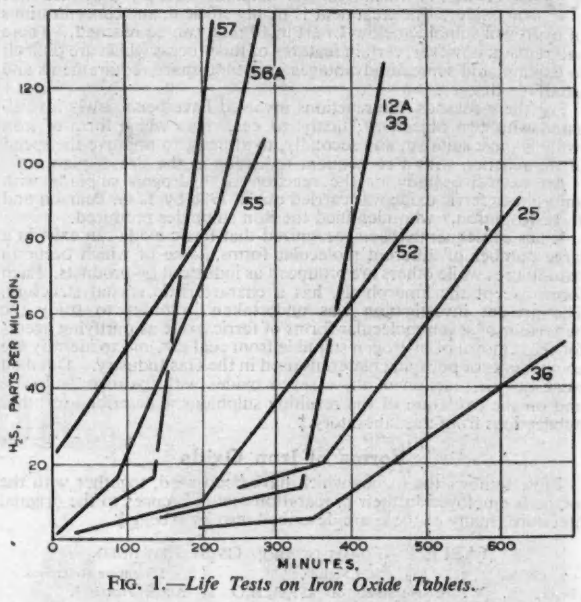

Fig. 1.—*Life Tests on Iron Oxide Tablets.*

TABLE III.—Tests on Iron Oxides.

Sample No.	Composition.	pH.	Porosity per cent. by Vol.	Break Point, minutes.	Slope after Break, parts per mill.
(1)	(2)	(3)	(4)	(5)	(6)
61	αFe_2O_3	9.5	76	85	13
24	$\alpha Fe_2O_3.H_2O$ ppt. deficiency NH_3	3	55	0	—
28	„ ppt. NH_3	4	71	0	—
33	„ ppt. Na_2CO_3	8.5	71	336	48
36	„ ppt. $(NH_4)_2CO_3$	—	—	355	7
48	$\alpha Fe_2O_3.H_2O$ sulphate-free	8	70	355	20
55	$\alpha Fe_2O_3.H_2O$ + 4 per cent. ferric sulphate.	5.5	—	80	23
43	$\alpha Fe_2O_3.H_2O$ from ferrous chloride	8.5	—	370	7
47	$\beta Fe_2O_3.H_2O$	5	64	0	—
45	γFe_2O_3	3	87	0	—
59*	„ + Na_2CO_3	8.5	78	90	18
44	$\gamma Fe_2O_3.H_2O$	6	84	0	—
52	„ + Na_2CO_3	10	87	200	13
57	$\delta Fe_2O_3.H_2O$	10	66	135	74
60	Amorphous $Fe_2O_3.H_2O$	10	55	50	32

TABLE IV.—Natural and Commercial Iron Oxides.

Sample No.	Source and Composition.	pH.	Porosity per cent. by Vol.	Break Point, minutes.	Slope after Break, parts per mill.
12A	By-product $\alpha Fe_2O_3.H_2O$	8	69	336	48
25	$\alpha Fe_2O_3.H_2O$ by hydrolysis of ferrite; contains Al_2O_3 and TiO_2	10	73	360	13
56	Bog ore; 20 per cent. of Fe as $\gamma Fe_2O_3.H_2O$, 45 per cent. as amorphous, remainder as αFe_2O_3 or its hydrate	6	—	0	—
56A	Bog ore and Na_2CO_3	8.5	—	220	45
41	Steel corrosion product 90 per cent. γFe_2O_3, 10 per cent. $\gamma Fe_2O_3.H_2O$	5	—	0	—
58	Steel corrosion product and Na_2CO_3	9.5	33	0	—

* *J.C.S.*, publication pending.
† British Patent No. 567,231. Gas Light and Coke Company and G. U. Hopton, 1943.
‡ British Patent Application No. 14575/43. Gas Light and Coke Company, R. H. Griffith and G. U. Hopton, 1943.

* Hollings, H., and Hutchison, W. K., *J. Inst. Fuel*, 1935, **8**, 360.
† Contains some amorphous oxide.

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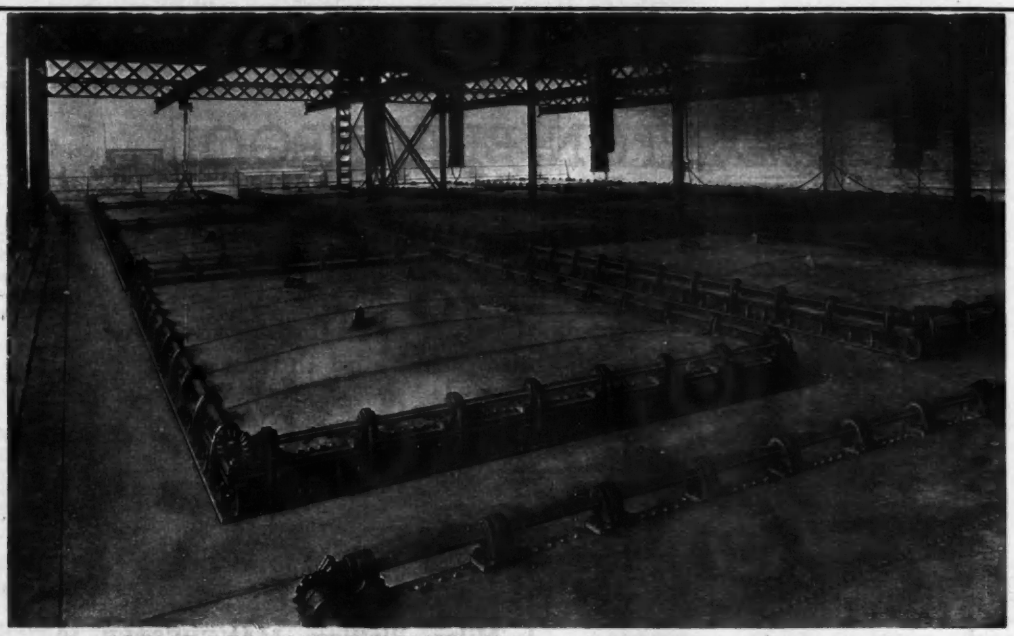

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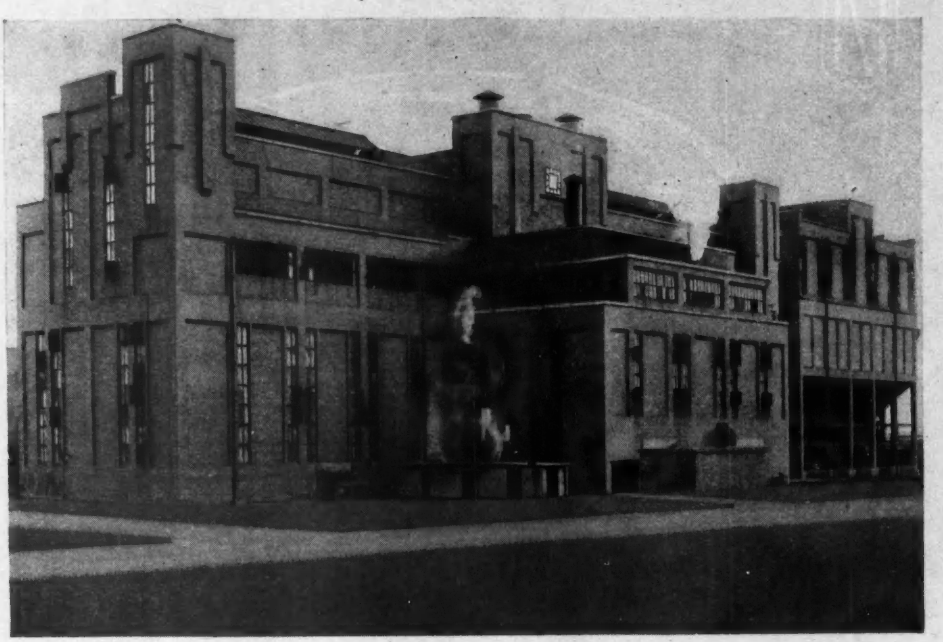

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Consecutive Runs and Regeneration.

In fig. 2 are shown typical results obtained when a fouled sample of $\alpha Fe_2O_3.H_2O$ tablets was regenerated by oxidation with air, and then used again for removal of H_2S. When sample 25 was re-oxidized under conditions such that the temperature never exceeded 27°C., the second run gave the line A, and a third run gave B; the fall in activity is here due to the deposition of sulphur, and extraction of the sulphur by means of CS_2 gave a material which was actually slightly superior to the original sample 25 when it was again tested under the standard conditions. This suggests some opening of the structure by the extensive deposit.

In contrast to this series, when another specimen of material 25 was similarly fouled but allowed to oxidize without any control of the temperature, which rose to 135°C., the resulting oxide was of extremely poor quality and gave the line C in fig. 2. Extraction of this material with CS_2 led to no improvement, and analysis showed the presence of 13.5% of sulphate.

Run Without Added Air.

To indicate the relative importance of the oxidation reaction in the tube test, an experiment was made with sample No. 25 tablets but without addition of air to the gas. This reduced the oxygen from 1.2 to 0.7%. The time of break was changed from 360 to 80 min. It is therefore clear that oxidation of $Fe_2S_3.H_2O$ plays an important part in the process even when the space velocity is high.

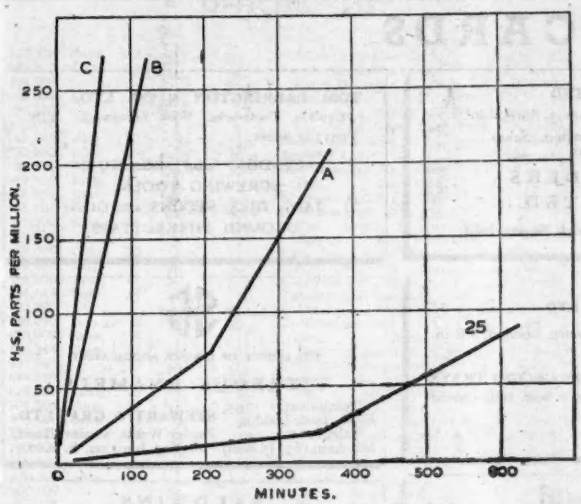

Fig. 2.—*Consecutive tests on $\alpha Fe_2O_3.H_2O$.*

Effect of Porosity.

A series of tablets was made with $\alpha Fe_2O_3.H_2O$ sample No. 12A, in which the porosity was reduced below the normal, in two stages. Table V shows that these changes had an immediate effect in shortening the break time.

TABLE V.—Effect of Reduction in Porosity.

Sample No.	Porosity, per cent. by Vol.	Break point, minutes.
12A	69	336
12B	65	100
12C	56.5	60

From the known molecular volumes of $Fe_2S_3.H_2O$ and $\alpha Fe_2O_3.H_2O$ it can be calculated that a tablet of the oxide with a volume porosity of 50% would be converted into a mass almost devoid of porosity, on complete change to the hydrated sulphide. It is therefore the volume porosity above 50% which determines the value of any particular material.

Results of Comparative Tests.

The observed efficiency of an oxide is the result of four separate processes; (*a*) the rate of its reaction with H_2S, (*b*) the penetration of H_2S through the sulphide layer formed, (*c*) the oxidation of the sulphide, and (*d*) the retardation of both reactions by deposition of sulphur. The time of break will be greater as the capacity for H_2S and the oxidation rate increase; the slope beyond the break point will also be less steep as these two factors increase.

The data in Tables III and IV show that the best performance is given by $\alpha Fe_2O_3.H_2O$, whether in a pure form or when obtained as an industrial product. The behaviour of $\gamma Fe_2O_3.H_2O$ is distinctly less satisfactory on a volume basis, but for a given weight of iron oxide is almost as good on account of its low bulk density. The anhydrous and amorphous forms of iron oxide are not suitable for use under the present conditions, and no material is useful when the pH is below 7.0.

The indicated break time for bog ore is subject to some correction in that this substance shows an appreciable slip of H_2S from the start, and although the life curve has the usual sharp inflexion it cannot strictly be compared with those of the other types of oxide. Immediate heavy slip of H_2S occurred with many samples; this does not necessarily mean that they would be useless in normal box practice.

Conclusions Drawn from Experimental Data.

By examination of all the information given above, the following conclusion may be reached:

1. The iron oxide must not be acid; this point has been stressed by earlier workers* with natural ores. For this reason, no comparable tests can be made with $\beta Fe_2O_3.H_2O$ which only appears to exist under acid conditions.
2. When the pH is satisfactory, say, 7.0, the best results are given by $\alpha Fe_2O_3.H_2O$: $\gamma Fe_2O_3.H_2O$ is nearly as good on a weight basis, but in a given volume its low packing density renders it less effective.
3. The presence of iron sulphate is undesirable as it readily hydrolyses, with consequent liberation of free acid; the presence of basic salts, which are precipitated from iron salt solutions under acid conditions, is similarly undesirable.
4. The presence of free sodium carbonate lowers the performance slightly, but serves a useful purpose in neutralizing any acid formed during repeated use. It is, of course, known that excessive alkali is undesirable with the system of rotation normally used in purifiers, because of the risk of evolution of small traces of H_2S from the last box.
5. Inert material is not necessarily harmful unless it reduces the porosity of the oxide, but it obviously diminishes the weight of iron oxide available in a given space.

* *E.g.*, Struck, P., *Gas-u. Wasserfach*, 1939, **82**, 269; Ghaud, W., and Reise, W., *ibid.*, 1929, **72**, 1251.

(*To be continued*)

Gas will Light the Streets of Caldicot, Monmouthshire. This was decided at a meeting of the villagers with a vote of 74 to 15 in favour of the installation of fifty-seven lamps.

British Sulphate of Ammonia Federation, Ltd., announce that their Secretarial and Accounts Department have been transferred to The Hoo, Whitwell, near Hitchin, Herts, to which all correspondence should be addressed.

The following recently issued British Standard Specification may be obtained on application to the Secretary, the Institution of Gas Engineers, 1, Grosvenor Place, London, S.W.1:—B.S. 1256 : 1945, Malleable Cast Iron and Cast Copper Alloy Pipe Fittings for Steam, Water and Gas. Price 3/6 net, post free.

The Codes of Practice Committee has issued for comment the draft Chapter VII Services (CP(B)502) of the Code of Functional Requirements of Buildings. The document is in nine parts, containing recommendations for water supply, cooking installations, refrigeration, laundering, telecommunications, sanitation and drainage, sewage disposal, and refuse storage and disposal. It presents in a convenient form a statement of the general functional requirements essential for good practice, and its recommendations are designed to be the basis for the General Series Codes covering the installation of these services. Copies may be obtained from the British Standards Institution, 28, Victoria Street, London, S.W. 1.

An Increase in Gas Sales of 6.3% over the previous year and of 131% over those for ten years ago was announced at the 19th annual meeting of the Gas Supply Company, Melbourne. Mr. R. A. Schuchard, Chairman, reported that as a result of the Government policy of decentralization many factories had been established in the towns served by the Company, with the result that increased gas and coke was required both for the factories and the homes of the workers. Extensive housing schemes are being developed, and in every case gas is being installed for cooking, water heating, and laundry work. In many cases the tenants are people who have previously lived outside areas supplied with gas, and the Company is providing for their instruction in its uses.

Dr. R. R. Nimmo, of Birmingham University, a member of the team of British scientists led by Professor L. M. Oliphant, who went to America to assist in the development of the atomic bomb, gave a talk on "Atomic Energy" to the North-Western Fuel Luncheon Club at Manchester on Nov. 7. Dr. Nimmo, who was deputizing for Professor P. M. S. Blackett, expressed the opinion that it was quite possible that within the next five years or so means might be discovered of producing atomic heat energy at a cost comparable with that of existing fuels. The change, however, could not occur overnight, and it would be a very long time before coal and oil were replaced as sources of heat. On Dec. 5 Mr. Harold Hobson, Chairman of the Central Electricity Board, will speak on "Some Post-War Problems of the Electricity Supply Industry," and an afternoon visit will be paid to Grid House, East Didsbury, the nerve-centre of the Central Electricity Board for North-West England and North Wales.

GAS PRODUCTS PRICES

The London Market Dec. 3.

The only changes in prices of Coal Tar Products are as follows:—

(1) Pitch for briquetting has been increased by 10s. per ton, making the price 70s. per ton f.o.r. at Suppliers' Works.

(2) The price to be paid to producers for Creosote/Pitch Mixture has been raised by 5s. per ton.

As from March 5, by the Coal Tar Products Prices Order, 1945 (S. R. & O. 1945, No. 229), the maximum price of Pitch for briquetting has been increased to 60s. per ton f.o.r. supplying works, and the prices for Road Tar, as fixed by the Coal Tar Products Prices Order, 1943, S. R. & O. No. 1528, have been increased by one half-penny per gallon. There is also an increase of 5s. per ton in the price of standard Creosote/Pitch Mixture.

Coal Tar Products Prices (No. 2) Order, 1944 (S. R. & O., 1944 No. 1051), allows increases in the maximum prices for all forms of Naphthalene.

The Provinces Dec. 3.

The average prices of gas-works products during the week were : Pitch and Crude Tar,* Toluole, naked, North, 90's. 2s. 4d. to 2s. 6½d., pure, 3s. 2½d. Carbolic acid, 60's, anthracene, creosote oil (hydrogenation), coal tar oils (timber preservation, &c.), and strained anthracene oil controlled by the Coal Tar Products Prices Order, 1943, dated Oct. 20, 1943 (S. R. & O. 1943, No. 1528), operative from Nov. 15, 1943, Naphthalene controlled under S. R. & O. 1944, No. 1051, operative from Sept. 22, 1944.

Attention is called to Coal Tar Products Prices Order, 1945 (S. R. & O. 1945, No. 229), referred to on p. 305, "JOURNAL" of March 7.

* In regard to pitch and crude tar prices we would ask readers to refer to the editorial note on p. 396 of the "JOURNAL" for Sept. 10, 1941.

Scotland Dec. 1.

Inquiries are still numerous with prices unchanged. Refined tar*: Yield to distilleers is 5d. per gallon *ex* Works, naked. Creosote oil: Timber preserving quality, 5½d. to 6½d.; hydrogenation oil,* 5½d.; low gravity or virgin oil,† 7½d. to 7½d.; benzole absorbing oil,* 6½d. to 8d. per gallon. Refined cresylic acid* is 3s. 6d. to 4s. 6d. per gallon *ex* Works, naked, according to quality. Crude naphtha†: 7d. to 8d. per gallon. Solvent naphtha*: Basic prices delivered in bulk, 90/160 grade, 2s. 10d., and 90/190 Heavy naphtha, Unrectified, 2s. 0½d.; Rectified, 2s. 4d. per gallon. Pyridine†: 90/160 grade, 13s., and 90/140 grade, 15s. per gallon.

* Price controlled. † Uncontrolled.

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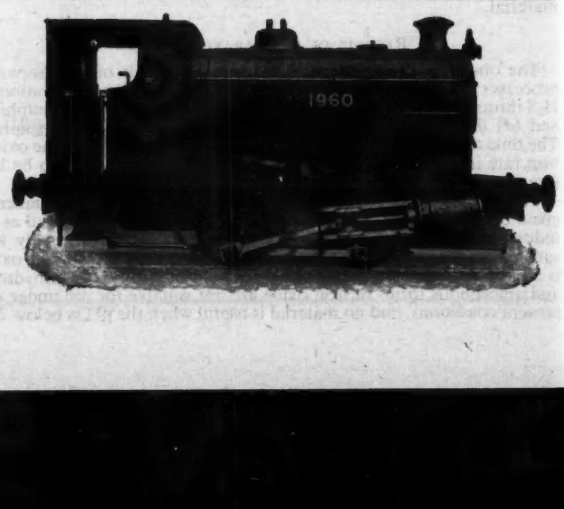

GAS STOCKS AND SHARES

A lack of confidence in the general industrial situation led to dullness in most sections of the Stock Exchange last week. There was a good demand at one time for short and medium-dated British Funds on the Chancellor's conversion programme, but the activity soon died down. Total markings for the week were nearly 4,000 less than the previous week.

Gas stocks and shares also participated in the general depression. The volume of business was on a much smaller scale, and the prices of a number of leading ordinary stocks were marked down. Having regard to the Industry's labour troubles and the fact that the securities are in a "near nationalization" group some weakness was inevitable. The same can be said of current prices compared with a month ago, for although a few quotations hardened, the general trend was downwards.

The following price changes were recorded last week:

OFFICIAL LIST

Barnet Ord.	158—163	—	1
Croydon 5 p.c. Deb.	122—127	—	1
Gas Consolidation "A" Ord.	21/9—22/9	—	/3d.
Ditto "B" Ord.	21/9—22/9	—	/3d.
Gas Light Units	21/3—22/3	—	/6d.
Imperial Continental	112—115	—	4
Primitiva Holdings Ltd.	12/6—13/6	—	/3d.
Severn Valley Gas Corporation Ord.	22/9—23/9	—	/3d.
South Metropolitan Ord	90—93	—	2
Ditto 6 p.c. Pref.	120—125	—	3
South Suburban 3½ p.c. Red. Pref.	97—102	+	2
Tottenham Ord.	112—117	—	1
Wandsworth Cons.	112—117	—	1

Quotations on the London and Provincial Stock Exchanges

OFFICIAL LIST

Issue. £	When ex-Dividend.	Dividends Interest. Amnt. or Rate% Prev. Hf. Yr. Actual.	Dividends Interest. Amnt. or Rate% Last Hf. Yr. Actual.	NAME	Quotations Nov. 29
1,767,439	Sept. 10	20/-	30/-	Alliance & Dublin Ord.	115—120
900,018	Oct. 29	6d.	6d.	Ascd. Gas & Water U'd'ts Ord.	21/9—22/9
389,000		7½d.	7½d.	Do. Deferred	22/—23/-
500,000	Sept. 3	2½	2½	Do. 4½ p.c. Red. Cum. Pref.	21/—22/-
536,000	"	2	2	Do. 4 p.c. Red. Cum Pref.	20/—21/-
342,000	"	2	2	Do. 4 p.c. Irred. Cum. Pref.	19/3—20/3
561,370	Aug. 20	70/-	70/-	Barnet Ord. 7 p.c.	158—163
150,000	June 11	8½d.	10½d.	Bombay, Ltd.	42/—45/-
690,526	Aug. 13	70/-	70/-	Bournemouth 7 p.c. max.	155—160
362,025	June 11	* 2	2	Do. 4 p.c. Deb.	102—107
659,955	Sept. 10	57/-	41/-	Brighton, &c., 5 p.c. Con.	108—113
855,000	" 24	60/-	60/-	Brit. Gas Light Ord.	120—125
545,000	June 25	2½	2½	Do. 5½ p.c. 'B' Cum. Pref.	115—120
120,000	" 18	2	2	Do. 4 p.c. Red. Deb.	95—100
100,000	Oct. 22	4/6	2½	Cape Town, Ltd., 4½ p.c. Cu. Pf.	13/—15/-
626,860	July 16	70/-	50/-	Cardiff Con. Ord.	120—125
24,500	Nov. 12	8½d.	8½d.	Colombo 7 p.c. Pref.	23/6—25/6
764,169	Sept. 24	4.78d.	6d.	Colonial Gas Assn. Ltd. Ord.	17/—19/-
400,000	"	7.649d.	9½d.	Do 8 p.c. Pref.	23/—25/-
1,748,090	July 22 '40	30/-	30/-	Commercial Ord.	66—71
620,000	June 4	1½	1½	Do. 3 p.c. Deb.	74—79
286,344	Aug. 27	2½	2½	Do. 5 p.c. Deb.	114—119
837,560	" 20	60/-	60/-	Croydon sliding scale	122—127
644,590	"	50/-	50/-	Do. max. div.	104—109
620,385	June 25	2½	2½	Do. 5 p.c. Perp. Deb.	122—127
179,500	Aug. 27	50/-	50/-	East Surrey 'B,' 5 p.c.	102—107
176,461	June 25	2½	2½	Do. 5 p.c. Deb. (Irred.)	122—127
239,135	Nov. 12	7½d.	6d.	Gas Consolidation Ord. 'A'	21/9—22/9
250,000	"	4½	4½	Do. Ord. 'B'	21/9—22/9
250,000	"	2	2	Do. 4 p.c. Red. Cum. Pref.	18/6—20/6
19,101,877	July 30	6d.	6d.	Gas Light & Coke Ord.	21/3—22/3a
2,600,000	"	35/-	35/-	Do. 3½ p.c. max.	80—85
4,477,106	"	2	2	Do. 4 p.c. Con. Pref.	101—104
2,993,000	July 16	1½	1½	Do. 3½ p.c. Red. Pref.	100—103
8,602,497	May 28	1½	1½	Do. 3½ c. Con. Deb.	89—92
3,642,770	"	2½	2½	Do. 5 p.c. Red. Deb.	106—109
3,500,000	"	2½	2½	Do. 4½ p.c. Red. Deb.	107—110
700,000	Sept. 17	1½	1½	Do. 3½ Red. Deb.	98—100
5,600,000	May 28	—	†£10	Imperial Continental Cap.	112—115
43,340	July 30	1½	1½	Do. 3½ p.c. Red. Deb.	97—100
2,167,410	Aug. 7	60/-	55/-	Liverpool Ord.	120—125
231,978	" 13	50/-	50/-	M.S. Utility 'C' Cons	108—113
918,657	"	2	2	4 p.c. Cons. Pref.	100—105
675,000	Nov. 12	‡40/-	‡40/-	Montevideo, Ltd.	109—114
300,000	" 23	£6	£4	Oriental, Ltd.	197—207
368,537	June 11	50/-	57/6	Plymouth & Stonehouse 5 p.c.	110—115
621,667	Aug. 13	72/6	72/6	Portsmouth & Gosport Cons.	155—160
2,386,371	July 9	†9½d.	†9½d.	Primitiva Holdings, Ltd. Ord.	12/6—13/6
226,860	June 11	3	3	Do. 6½ p.c. Red. Cum. Pref.	102—107
648,999	Sept. 10	6½	6½	Severn Val. Gas Cor Ld. Ord.	22/9—23/9
597,972	"	2½	2½	Do. 4½ p.c. Cum. Pref.	22/—23/-
2,528,714	Aug. 27	6d.	3½d.	South East'n Gas Cn. Ld. Ord.	20/—21/-
1,000,000	"	2½	2½	Do. 4½ p.c. Red. Cum. Pref.	21/3—22/3
1,068,869	"	2	2	Do 4 p.c. Irred. Cum. Pref.	19/9—20/9
6,709,895	Aug. 20	†40/-	30/-	South Met. Ord.	90—93
1,135,812	"	3	3	Do. 6 p.c. Irred. Pref.	120—125
850,000	"	2	2	Do. 4 p.c. Irred. Pref.	100—103
1,895,445	July 2	1½	1½	Do 3 p.c. Perp. Deb.	88—91
1,000,000	" 16	2½	2½	Do. 5 p.c. Red. Deb.	102—107
1,543,795	July 2	50/-	50/-	South Suburban Ord. 5 p.c.	113—118
512,825	"	2½	2½	Do. 5 p.c. Perp. Pref.	111—116
500,000	"	2	2	Do. 4 p.c. Perp. Pref.	99—104
250,000	"	1½	1½	Do 3½ p.c. Red. Pref.	97—102
888,587	June 11	2½	2½	Do. 5 p.c. Perp. Deb.	122—127
750,541	Aug. 13	50/-	50/-	Southampton Ord.	108—113
350,000	" 13	2½	2½	Swansea 5½ p.c. Red. Pref.	105—110
1,076,490	" 7	50/-	50/-	Tottenham & District Ord.	112—117
338,555	"	2½	2½	Do. 5 p.c. Pref.	111—116
453,380	June 11	2	2	Do. 4 p.c. Perp. Deb.	100—105
1,483,664	Nov. 12	7½d.	6d.	U. Kingdom Gas Cor. Ord.	20/6—21/6
1,085,952	"	5½d.	5½d.	Do. 4½ p.c. 1st Cum. Pref.	21/6—22/6
772,709	"	4½d.	4½d.	Do. 4 p.c. 1st Red. Cum. Pref.	20/—21/-
745,263	June 18	5½d.	5½d.	Do. 4½ p.c. 2nd Non. Cum. Pf.	20/3—21/3
1,200,000	Sept. 17	1½	1½	Do. 3½ p.c. Red. Deb.	97—102
380,608	Aug. 13	66/3	66/3	Uxbridge, &c., 5 p.c.	124—129
1,371,138	July 30	50/-	50/-	Wandsworth Consolidated	112—117
2,525,768	"	2	2	Do. 4 p.c. Pref.	101—104
1,343,964	June 18	2½	2½	Do. 5 p.c. Deb.	122—127
383,745	"	2	2	Do. 4 o.c. Deb.	100—105
558,342	Aug. 13	50/-	50/-	Watford & St. Albans Ord.	114—119

SUPPLEMENTARY LIST

Issue. £	When ex-Dividend.	Dividends Interest. Amnt. or Rate% Prev. Hf. Yr. Actual.	Dividends Interest. Amnt. or Rate% Last Hf. Yr. Actual.	NAME.	Quotations Nov. 29
351,685	June 18	2½	2½	Brighton, &c., 5 p.c. Perp. Deb.	122—127
415,250	"	2	2	Bristol Gas Co., 4 p.c. New Deb.	101—104
140,205	July 30	70/-	70/-	Cambridge, &c., 7 p.c. Cons. 'B'	141—146
295,932	Aug. 20	50/-	50/-	Cheltenham, 5 p.c. Cons. Ord.	107—112
42,500	June 18	2	2	Do. 4 p.c. Perp. Deb.	100—105
150,000	Aug. 20	2	2	Croydon Gas, 4 p.c. Pref. (Irr.)	100—105
130,000	June 25	2	2	Do. 4 p.c. Deb.	100—105
53,220	Aug. 27	3	3	East Surrey, 6 p.c. Cum. Pref.	123—128
...	Aug. 19 '40	40/-	40/-	Eastbourne, 'B' 3½ p.c.	97—102
117,425	March 1	—	£6	East Wight Cons. 5 p.c.	115—120
25,000	June 18	2½	2½	Guildford 4½ p.c. Red. Deb.	103—105
156,600	Aug. 13	50/-	50/-	Hampton C't, 5 p.c. Cons. Ord.	114—119
18,000	May 28	—	£7	Malta & Med'n., 7 p.c. 1st Pref.	90—100
10,845	"	—	£7½	Do. 7½ p.c. 2nd Pref.	90—100
50,000	Aug. 13	52/3	52/3	Mid. South. Util., 'A' Cons. 5 p.c.	107—112
70,380	June 25	2½	2½	Newport (Mon.), 5 p.c. Deb.	120—125
65,000	Aug. 13	2½	2½	North Middlesex, 5 p.c. Pref.	110—115
70,000	Sept. 10	2½	2½	Plymouth & Stone., 5 p.c. Deb.	120—125
76,501	June 18	2	2	Reading, 4 p.c. Perp. Deb.	100—105
74,777	Oct. 1	2	2	Romford, 4 p.c. Debs. (Reg.)	98—103
21,000	June 11	2½	2½	Slough, 5 p.c. Perp. Deb.	122—127
211,740	" 18	2½	2½	Southampton, 5 p.c. Red. Deb.	105—110
363,575	July 2	2½	2½	Tottenham, 5 p.c. Reg. Red. Mt.	99—102
202,019	Sept. 24	75/-	75/-	Tunbridge Wells, 4 p.c. Scale	140—145
135,257	June 11	2½	2½	Uxbridge &c., 5 p.c. Perp. Deb.	122—127

PROVINCIAL EXCHANGES

					Quotations Nov. 26
804,948	Aug. 7	2½	2½	Bath Cons.	113—115
122,577	Aug. 20	4½	3	Blyth 5 p.c. Ord.	124—126
1,667,250	July 16	2½	2½	Bristol, 5 p.c. max.	118—120
120,420	June 18	2	2	Do. 1st 4 p.c. Deb.	102—104
415,250	"	2	2	Do. 2nd 4 p.c. Deb.	101½—103½
3 28,790	"	2½	2½	Do. 5 p.c. Deb.	122—124
157,150	Aug. 7	3½	2½	Chester 5 p.c. Ord.	115—117
52,500	June 18	2	2	Do. 4 p.c. Cum. Pref.	99—101
40,000	"	2	2	Do. 4 p.c. Non. Cum. Pref.	99—101
36,430	"	1½	1½	Do. 3½ p.c. Deb.	88—92
41,890	"	2	2	Do. 4 p.c. Red. Deb	100—102
542,270	Aug. 7	4½	3	Derby Cons.	132—137
55,000	June 18	2	2	Do. 4 p.c. Deb.	98—103
40,000	Aug. 7	5½	5½	Exeter 10 p.c.	185—195
10,000	" 13	5	5	Great Grimsby 'A' Ord.	175—185
6,500	"	5	5	Do. 'B' Ord.	175—185
79,000	"	5	5	Do. 'C' Ord.	165—175
732,000	Aug. 27	2	2	Hartlepool G. & W. Cn. & New	91—93
490,681	June 18	1½	1½	Liverpool 3½ p.c Red. Deb. Stk.	95—100
245,500	"	2	2	Do. 4 p.c. Red. Deb. Stk.	102—103
306,083	July 2	2	2	Do. 4 p.c. Deb.	103—105
680,000	June 4	2½	2½	Do. 5 p.c. Red. Stk.	104—109
20,000	"	2½	2½	Long Eaton 5 p.c. Pref.	9—11
80,000	"	2½	2½	Do. 5 p.c. Deb.	117—122
2,430,267	Aug. 7	2½	2½	Newcastle and Gateshead Con.	24/9—25/3a
682,856	"	2	2	Do 4 p.c. Pref.	102—104
776,706	June 25	1½	1½	Do 3½ p.c. Deb.	100—102
250,000	"	1½	1½	Do. 3½ p.c. Red. Deb.	100—102
73,186	*Oct. 29	2	2	Do. 4 p.c. Red. Deb.	102—104
106,280	Aug. 13	5	5	Preston 'A' 10 p.c.	195—200
188,219	"	3½	3½	Do. 'B' 7 p.c.	145—150
1,806,339	Aug. 27	3½	3½	Sheffield Cons.	143—147
95,000	July 30	2	2	Do. 4 p.c. Deb.	98—102
332,351	Aug. 13	3	3	Sunderland 6 p.c. max.	124—126
192,150	" 13	2½	2½	Weston-super-Mare Cons.	112½—114½
64,338	July 2	2	2	Do. 4 p.c. Deb.	99—101
33,340	"	3½	3½	Do. 7½ p.c. Deb.	145—150

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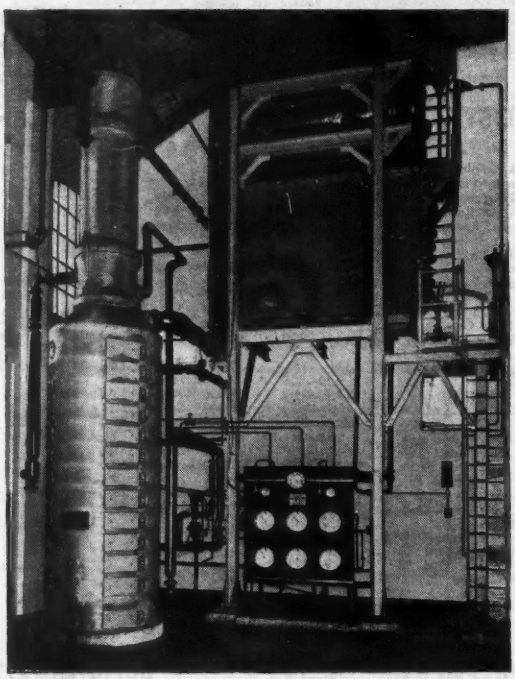

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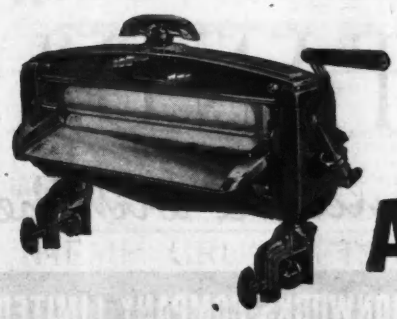

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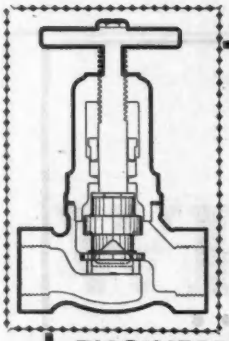

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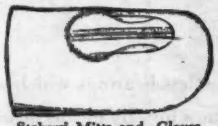
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COMPANY NOTICES

HORNSEY GAS COMPANY

NOTICE IS HEREBY GIVEN that the TRANSFER BOOKS of this Company, relating to DEBENTURE STOCKS only, will be closed from the 18th to the 31st December, 1945, both days inclusive.

Gas-Works, Hornsey, N. 8. December 5, 1945.
By Order of the Board, K. LESLIE MORTIMORE, General Manager and Secretary.

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PATENTS

NOTICE IS HEREBY GIVEN that R. & A. Main Ltd. and Arthur John Adam seek leave to amend the Specification of the application for Letters Patent No. 570,383 entitled "Improvements in or relating to multi-jet luminous type gas-heating burners."

Particulars of the proposed amendment were set forth in the Official Journal (Patents) No. 2966 dated November 28, 1945.

Any person may give Notice of Opposition to the amendment by leaving Patents Form No. 19 at the Patent Office, 25, Southampton Buildings, London, W.C. 2, on or before the 28th December, 1945.

H. L. SAUNDERS, Comptroller-General.

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70 & 72, Chancery Lane, London, W.C.2.
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And 3, St. Nicholas Buildings, Newcastle-on-Tyne.

PLANT &c. FOR SALE & WANTED

'PHONE 98 STAINES.

FOR SALE.—24 ft. by 9 ft. and 17 ft. by 6 ft. Cylindrical Tanks; Thompson Lancashire Boiler 24 ft. by 7 ft., 120 lb.; 34 kw. Browett 220 volt Steam Generating Set; Weir Feed Pump 8¼ in. by 6 in. by 18 in.; Tangye 3-Throw Hydraulic Pump 3½ in. by 6 in.; Receiver 30 ft. by 7 ft. dia., dish ends ½ in. plate.

HARRY H. GARDAM & CO., LTD., STAINES.

FOR DISPOSAL.—A quantity of surplus gas-works plant now lying at Whetstone Gas-Works (80 million per annum) and Coalville Gas-Works (70 million per annum), including retort house equipment, coal handling plant, Morris manual retort charger, "Simplex" blue water gas plant, condensers, exhausters, washers, scrubbers, pre-heater, purifiers, vaporizer, station meter, booster, scrap gasholder, storage tanks, coke cutting and grading plant, etc. List on application to James Mitchell, Engineer and Manager, City of Leicester Gas Department, Gas Offices, Leicester.

URGENTLY REQUIRED for PUBLIC LIGHTING —New or Second-hand.—One Gross of Suggs Fig. 4, Conversion Sets No. 1358 or similar. Price and particulars to General Manager, Gas Offices, Merthyr Tydfil.

FOR DISPOSAL.—A quantity of surplus gas-works plant, including steam engines, gas engines, electric motors, compressors, governors, retort mouthpieces, washers and scrubbers, &c., also cast-iron pipe specials. List on application to Severn Valley Gas Corporation, Ltd., Gas-Works, Cheltenham.

BURGH OF MOTHERWELL AND WISHAW
(GAS DEPARTMENT)

FOR SALE.—One 60,000 cubic feet per hour "WALLER" EXHAUSTER complete with governor. 12-in. inlet and outlet connexions.

Further details and particulars can be had from the Subscriber, to whom applications should also be made for inspecting the plant.

Gas Offices, Merry Street, Motherwell. November 26, 1945.
WILLIAM KIRK, Engineer and Manager.

(Classified Advertisements continued on p. 820)

MISCELLANEOUS

LARGE quantities of good rough Breeze required by factors paying own Railway Tolls. Price and particulars to No. 9376, "GAS JOURNAL," 11, Bolt Court, Fleet Street, E.C. 4.

GRAVITY die casting capacity available. Highest quality work, electrical specialities, &c., in commercial alloys. Address No. 9506, "GAS JOURNAL," 11, Bolt Court, Fleet Street, E.C.4.

APPOINTMENTS WANTED

APPOINTMENT required as ENGINEER AND GENERAL MANAGER with Gas Undertaking of repute. Fully qualified Engineer, A.M.I.Mech.E. 20 years' managerial experience.
Those interested kindly communicate with No. 9494, "GAS JOURNAL," 11, Bolt Court, Fleet Street, E.C. 4.

APPOINTMENTS VACANT

None of the situations advertised in these columns relates to a man between the ages of 18 and 50 inclusive or a woman between the ages of 18 and 40 inclusive, unless he or she is excepted from the provisions of the Control of Engagement Order, 1945, or the vacancy is for employment excepted from the provisions of that Order.

APPLICATIONS are invited for the Position of ASSISTANT DISTRIBUTION ENGINEER to the Hampton Court Gas Company, at a commencing salary of £400 per annum. Candidates should possess the Institution of Gas Engineers' Certificate in Gas Supply, or its equivalent, and must be experienced in all branches of Gas Distribution.

Applications, stating Age, Qualifications, and Experience, together with a *copy* of a recent Testimonial, should be forwarded to the undersigned not later than December 15.—C. T. Price, Engineer and General Manager, Gas-Works, Hampton Wick, Kingston-on-Thames.

COUNTY BOROUGH OF BLACKBURN

(GAS DEPARTMENT)

APPOINTMENT OF WORKS SUPERINTENDENT

APPLICATIONS are invited for the Position of WORKS SUPERINTENDENT to the Gas Undertaking, who will be responsible for the manufacture and purification of coal and carburetted water gas.

Candidates must have a sound technical and practical experience in the manufacture of coal gas in Glover West Vertical Retorts, the manufacture of carburetted water gas and benzole extraction. They must be fully conversant with the purification of gas, and capable of supervising the repairs and maintenance of plant generally.

The Salary will be £430 per annum, plus £49 17s. War Bonus, plus free house, coal and gas.

The appointment will be subject to the provisions of the Local Government Superannuation Act, 1937, and the person selected will be required to pass a medical examination.

Applications endorsed "Works Superintendent," stating Age, Training, Experience, Qualifications and present position, accompanied by three recent Testimonials, should be delivered to the Engineer and Manager, Gas Department, Town Hall, Blackburn, not later than Wednesday, December 12, 1945.

CHAS. S. ROBINSON,
Town Clerk.

COMPETENT CHEMIST required for Coal Testing in Gas-Works Laboratory. Preference given to person having had similar experience. Good prospects of advancement. Salary £350 per annum, inclusive. Applicants should submit full details of training and experience to Severn Valley Gas Corporation, Ltd., Gas-Works, Cheltenham.

MECHANICAL PLANT FITTER required on a gas-works in the Home Counties for general repairs o steam engines and turbines, exhausters, pumps, compressors, &c. Applicant should be an experienced machinist. Wages 2s. 2½d. per hour minimum, or according to ability. Apply, stating Age, Training and Experience to No. 9498, "GAS JOURNAL," 11, Bolt Court, Fleet Street E.C. 4.

BLACKSMITH required for a gas-works in the Home Counties. Wages minimum 2s. 0½d. per hour according to ability. Apply, stating Age, Training, and Experience to No. 9499, "GAS JOURNAL," 11, Bolt Court, Fleet Street, E.C. 4.

EXHAUSTER ATTENDANT AND BOILERMAN required on a gas-works in the Home Counties. Wages for seven 8-hour shifts, £6 10s. per week, including War Bonus. Apply, stating Age, Training and Experience to No. 9500, "GAS JOURNAL," 11, Bolt Court, Fleet Street, E.C. 4.

MACHINIST required for lathework, &c., in the machine shop of a gas-works in the Home Counties. Wages minimum 2s. 0½d. per hour or according to ability.
Apply, stating Age, Training and Experience to No. 9501, "GAS JOURNAL," 11, Bolt Court, Fleet Street, E.C 4.

VACANCY for MAIN AND SERVICE LAYER or man willing to learn. District Union rate of wages and good prospects for suitable applicant. Apply to The Manager, Okehampton Gas Company, Ltd., Station Road, Okehampton, Devon.

TEIGNMOUTH URBAN DISTRICT COUNCIL

(GAS DEPARTMENT)

TECHNICAL ASSISTANT

APPLICATIONS are invited for the above Position at a commencing Salary of £300 per annum, plus War Bonus, at present £59 10s.

Candidates should be capable of carrying out all the usual routine works tests, and experience with Horizontal Retorts, Water Gas and Benzole Recovery will be an advantage.

The appointment will be subject to the Local Government Superannuation Act (1937), and the successful candidate will be required to pass a medical examination.

Applications, giving details of experience and qualifications, together with *copies* of three recent Testimonials, to reach the undersigned not later than Saturday, December 15, 1945.

Gas Department, Teighmouth, Devon.
R. MASON,
Engineer and Manager.

November 7, 1945.

(The Ministry of Labour and National Service have given permission under the Control of Engagement Order, 1945, for the advertisement of this vacancy. A 9 (C).)

PEMBROKE DISTRICT GAS COMPANY

APPLICATIONS are invited for the Position of DISTRIBUTION SUPERINTENDENT to the above Company, at a commencing salary of £4 10s. per week and War bonus, at present 23s. per week.

Applicant must be fully conversant with, and have a sound practical knowledge of all modern appliances, main and service laying, public lighting, and must be capable of preparing estimates and supervising men.

Possession of City and Guilds Certificate in Gas Fitting and Supply will be an advantage.

Applications endorsed District Superintendent, stating Age, Qualifications, Training and Experience, accompanied by two recent Testimonials, must be received by the undersigned not later than December 20, 1945.

Gas Offices, Pembroke Dock.
DARRELL W. REES, M.B.E.,
Engineer and Manager.

CITY OF ABERDEEN

APPLICATIONS are invited for the Position of JUNIOR ENGINEERING ASSISTANT in the Corporation Gas Department.

Applicants, who should hold recognized technical qualifications in Civil or Mechanical Engineering, must be experienced in Drawing Office and Site or Shop erection work. The post is superannuable, and the candidate selected will be required to pass a medical examination before appointment.

The salary will be £270, rising by increments of £10 per annum to £300 per annum (plus War Bonus, which is meantime at the rate of £60 per annum). Placing will be in accordance with qualifications.

Applications, accompanied by a *copy* of each of three recent Testimonials, must be lodged with H. S. Milne, City Gas Engineer, Cotton Street, Aberdeen, on or before Wednesday, December 12, 1945.

Town House, Aberdeen.
D. B. GUNN,
Town Clerk.

November 27, 1945.

(The Ministry of Labour and National Service have given permission under the Control of Engagement Order, 1945, for the advertisement of this vacancy.)

PRESTATYN URBAN DISTRICT COUNCIL

APPOINTMENT OF GAS ENGINEER AND MANAGER

APPLICATIONS are invited from persons with the appropriate qualifications for the appointment of GAS ENGINEER AND MANAGER.

Applicants should have experience in Works Management and Gas distribution in Urban and Rural Areas. The successful candidate will be responsible for the control and development of the Council's Gas Undertaking, subject to direction by the Gas Committee.

The commencing salary will be £525 per annum based on a sale of 100 million cubic feet per annum, rising by £37 10s. for each complete increase of 25 million cubic feet per annum to a maximum of £600, plus cost-of-living bonus (now £59 16s. per annum).

The appointment will be subject to the provisions of the Local Government Superannuation Acts, and will be determinable by three months' notice on either side. A medical examination will be necessary.

Applications, stating Age, Qualifications and Experience, accompanied by *copies* of not more than two Testimonials, should reach the undersigned not later than January 1, 1946, and should be endorsed "Gas Engineer and Manager."

Canvassing, directly or indirectly, will be a disqualification.

Council Offices, Prestatyn.
J. LLOYD HUGHES,
Clerk of the Council.

November, 1945.

REQUIRED.—FIRST CLASS GAS FITTER, rate 1s. 11½d. per hour. Applications, giving details of Training and Experience, also stating position under Essential Works Order, to Mr. T. V. Johns, Managing Director, Lowestoft Water and Gas Company, 165, High Street, Lowestoft, Suffolk.

(This advertisement has been approved by the Ministry of Labour and National Service under the Control of Engagement Order, 1945.)

DRAUGHTSMEN wanted with experience in Structural and Mechanical work as applied to Gas-works Coal and Coke Handling Plant. Apply stating Age, Experience, &c., to W. J. Jenkins & Co., Ltd., Retford, Notts.

This advertisement is inserted with the permission of the Ministry of Labour and National Service.

EXETER GASLIGHT AND COKE COMPANY

APPLICATIONS are invited for the Position of ASSISTANT ENGINEER AND GENERAL MANAGER to the above Company. The commencing salary will be £700 per annum. Candidates should state their Age, giving details of Training, Qualifications, and Experience, and three references.

Applications should be addressed to H. H. Brown, Engineer and General Manager, 11-13, Southernhay East, Exeter, and should be received not later than December 22, 1945.

BURGH OF PAISLEY

APPOINTMENT OF GAS ENGINEER AND MANAGER

THE TOWN COUNCIL OF PAISLEY invite Applications for the post of GAS ENGINEER AND MANAGER at a commencing Salary of £800, rising by annual increments of £50 to £1,100 per annum, plus J.I.C. bonus with placing at the discretion of the Town Council.

The post is designated under the Local Government and Other Officers' Superannuation Acts, 1922 to 1937, and the successful applicant will be required to pass a medical examination and contribute to the Corporation's Superannuation Fund.

Applicants must be corporate members of the Institution of Gas Engineers, and must have experience of the administration and control of all departments of a Gas Undertaking. Possession of the Gas Engineering (Manufacture) Diploma of the Institution of Gas Engineers will be considered an advantage.

Applications, stating Age, Training Qualifications, and Experience, together with *copies* of three recent Testimonials, should be addressed to the undersigned for receipt not later than 12 noon on December 22, 1945, in an envelope endorsed "Gas Engineer and Manager."

Municipal Buildings, Paisley.
JOHN P. MORRISON,
Town Clerk.

November 29, 1945.

HALESOWEN GAS COMPANY

ASSISTANT ENGINEER AND MANAGER

APPLICATIONS are invited for the above Position. Experience with horizontal retorts, C.W.G. plant and general works training is desired. The Salary will be £350 per annum, plus £60 war bonus. Living accommodation available if required. Applicants should state their Age, giving details of Training, Qualifications and Experience, with *copies* of three Testimonials, not later than December 17, 1945.

Gas Offices, Halesowen, Worcestershire.
J. H. WAINWRIGHT,
Engineer, Manager and Secretary.

COUNTY BOROUGH OF OLDHAM

(GAS DEPARTMENT)

TEMPORARY DRAUGHTSMAN

APPLICATIONS are invited for the Position of TEMPORARY DRAUGHTSMAN for a period of 18 months at a Salary of £405 per annum, plus cost-of-living bonus (at present 23s. per week).

Applicants must be competent draughtsmen, preferably with training in the Drawing Office of a Gas Plant Contractor, and must have a good practical knowledge in the design and construction of Gas-Works Plant, Structural Engineering and Foundation Work, and also capable of taking out quantities and preparing Specifications.

Applications stating Age, Qualifications, Experience and Present Position, together with position in relation to the National Service Acts and Essential Works Order, accompanied by *copies* of two recent Testimonials, endorsed "Draughtsman," should be forwarded to F. Greenhalgh, M.Inst.Gas E., Engineer and General Manager, Oldham Corporation Gas Department, Greaves Street, Oldham, and received not later than first post of Monday, December 24, 1945.

Canvassing or submitting Testimonials from members of the Council or of any Committee appointed by the Council will be a disqualification.

Town Hall, Oldham.
THOMAS ALKER,
Town Clerk.

December 1, 1945.

BOROUGH OF OLDBURY

(GAS DEPARTMENT)

SHIFT SUPERINTENDENT

SHIFT SUPERINTENDENT REQUIRED. Applicants should have a practical knowledge of gas-works plant and routine, and be experienced in the working of continuous vertical retorts (preferably Glover-West) and Carburetted Water Gas Plant.

Salary £300 per annum plus war bonus (at present £59 16s. per annum).

Applications stating Age, Experience and position under Essential Works Order should be received by the undersigned not later than Saturday, December 22, 1945.

Municipal Buildings, Oldbury.
ARTHUR CULWICK,
Town Clerk.

November 29, 1945.

PUBLIC UTILITIES' SERVANT

● Bristol's recorders are furnished in two sizes, and several models to help Public Utility Engineers and Managers to keep close control on pressure, vacuum, liquid level and temperature variations.

Models are available in 8" or 12" chart sizes for wall or flush panel mounting for plant usage, portable types for inter plant and distribution recording, and metameter types for long distance recording or controlling of variables.

● In pressure and vacuum ranges Bristol's gauges cover all requirements from 2/10" head of water up to 10,000 lbs./sq. in. Daily, weekly or dual speed charts giving a daily or weekly record at will meet the Engineers demands for a gauge—reasonable in price—but accurate and reliable and capable of giving continuous service for "teens" of years.

● Bristol's liquid level gauges offered in three types—float operated, diaphragm actuated or air reaction system—meet all needs for the recording of levels of fluids, whether clear, viscous or charged with solids, in overhead or underground tanks, reservoirs or channels.

● Bristol thermometers are available using one of three filling systems, liquid, gas or vapour. By a careful and considered choice of the system, a thermometer is built to exactly meet the needs of the application under consideration. Having a range of three systems to choose from, Bristol's engineers can make an unbiassed selection and so provide a thermometer which will meet the necessary requirements with no undue stressing of the instrument design, thus ensuring an accurate trouble free instrument.

● For long distance transmission the Bristol Metameter fulfils all requirements. Transmission distances are unlimited, any convenient source of power of any voltage, A.C. or D.C., can be used. Synchronising sources of power at both ends of the system are unnecessary The Metameter is self starting and automatically indicates line faults, it is unaffected by line voltage resistance fluctuations.

● When next considering instruments why not take advantage of Bristol's 54 years experience of instrument making and send us your enquiries? Bristol's Consultant Engineering Service is available to all Public Utility Engineers free and without obligation.

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These conveyors cut costs by 75%

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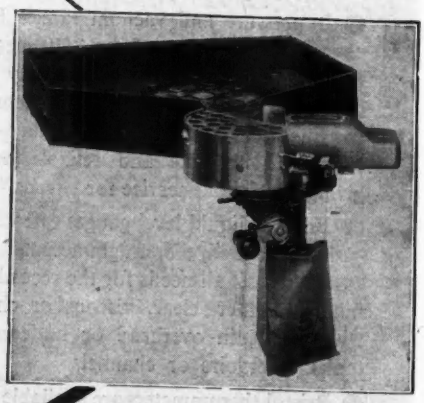
THIS MACHINE COUNTS FOR YOU!

How can any business which deals daily with large numbers of coins do without a counting machine? Is it fair to your business or your employees to rely on the human element when thousands of coins must be counted daily? Could not that human element be better employed doing other and more important work?

Many Gas Companies and the Wages Departments of hundreds of firms depend entirely on the service these machines can give. They are, in the first place, absolutely accurate . . . they stop automatically on £5 worth of silver and 5/- worth of copper . . . and they count at the rate of a 1,000 coins per minute.

All over the world these counting machines are proving their worth.



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BLUE WATER GAS & PRODUCER GAS

FOR PRIMARY SUPPLY & PEAK LOAD

CARBURETTED WATER GAS

FOR OTHER APPLICATIONS

HYDROGEN

(By Steam-Iron or Catalytic Processes)

CARBON MONOXIDE

CARBON DIOXIDE

★*The Gas making Plants for using COKE (including both blue and carburetted water gas) supplied by us in the last 10 years alone have a nominal rated capacity of over 2,000,000 TONS OF COKE ANNUALLY.*

This excludes the very large number of installations since 1940 specially for emergency purposes.

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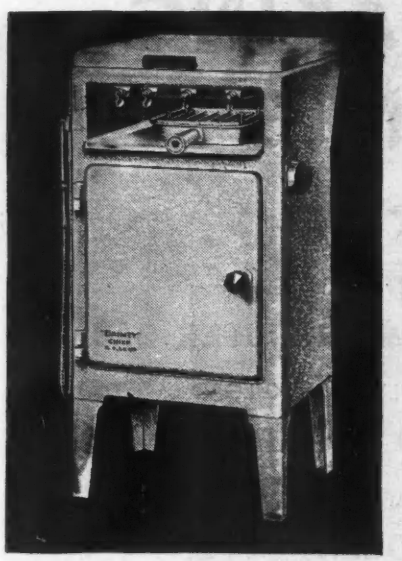
SPECIALISTS IN DESIGN AND CONSTRUCTION OF PLANTS FOR THE PRODUCTION, COOLING CLEANING & PURIFICATION OF INDUSTRIAL GASES

THE POWER-GAS CORPORATION LIMITED

STOCKTON - ON - TEES

The DAINTY Chief



Streamlined modern design, cast iron construction and many other special features—notably economical consumption of gas.

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Pyrene Metal Surface Treatment Processes made their initial appearance in the nineteen-twenties when Parkerizing was introduced. Since then the following significant advancements have been made:—

1931 "BONDERIZING" for Paint Anchorage.

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IT CANNOT BE PARKERIZED (Registered) OR BONDERIZED (Registered)

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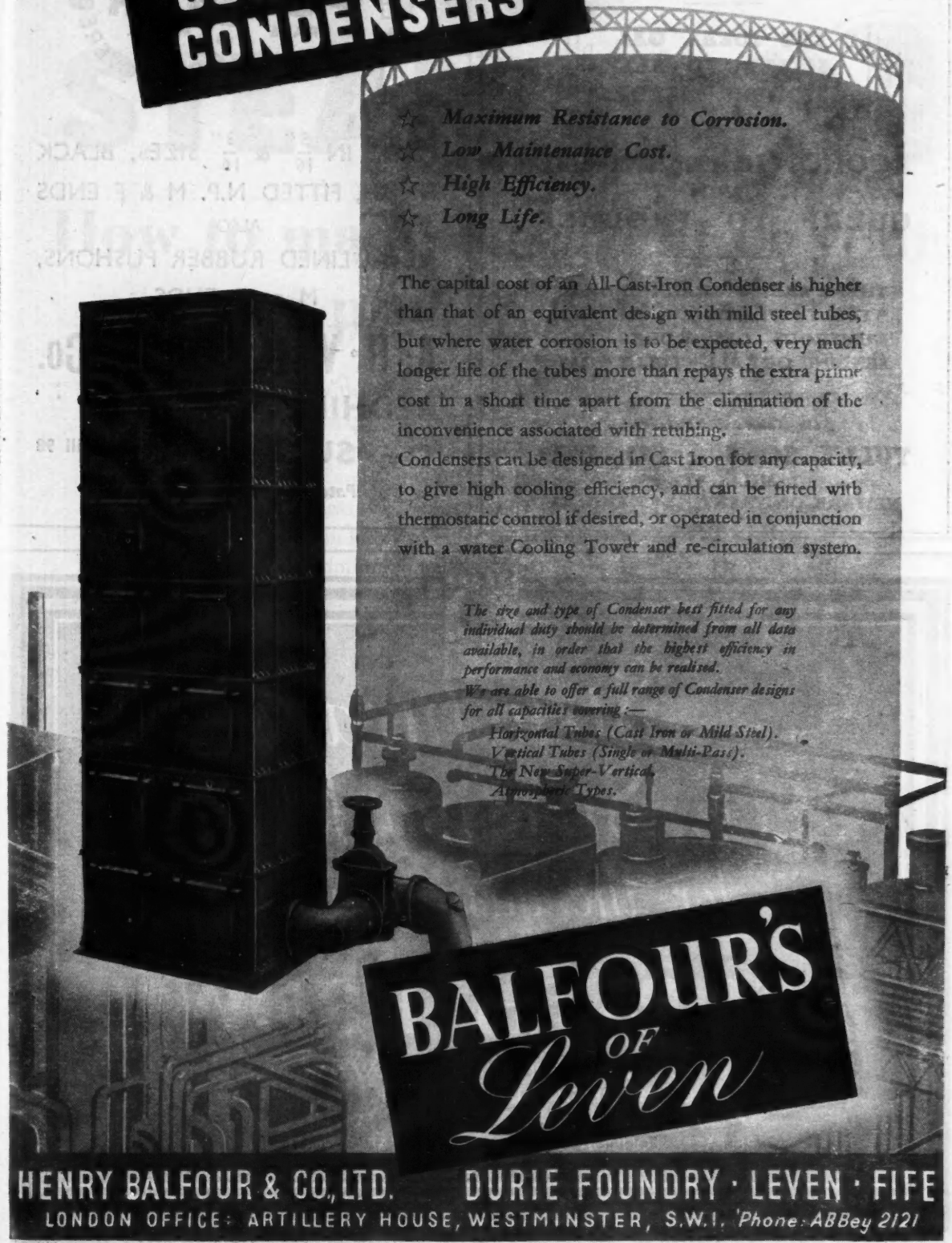

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The capital cost of an All-Cast-Iron Condenser is higher than that of an equivalent design with mild steel tubes, but where water corrosion is to be expected, very much longer life of the tubes more than repays the extra prime cost in a short time apart from the elimination of the inconvenience associated with retubing.

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The size and type of Condenser best fitted for any individual duty should be determined from all data available, in order that the highest efficiency in performance and economy can be realised.
We are able to offer a full range of Condenser designs for all capacities covering :—

Horizontal Tubes (Cast Iron or Mild Steel).
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FLEXIBLE TUBING "FULBOR" TRADE MARK RUBBER COVERED

MADE IN $\frac{5}{16}$" & $\frac{3}{16}$" SIZES, BLACK FINISH, FITTED N.P. M & F ENDS
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METAL-LINED RUBBER PUSHONS, M or F ENDS

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Structural Steelwork for the gas industry

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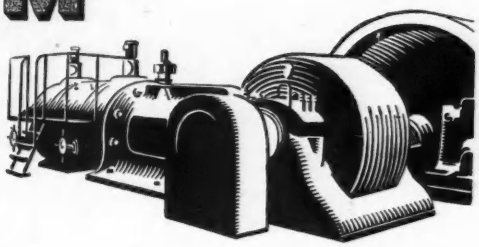
Telephone: REGENT 0345.

Printed by Straker Brothers, Ltd., London, E.C.2, for Walter King, Limited, 11, Bolt Court, Fleet Street, London, E.C.4.—Wednesday, December 5, 1945.

POWER FROM STEAM



How to make a servant of your power-producing medium

A good captain knows the idiosyncrasies of his team; a good workman knows his tools—a bad one blames them. You cannot expect to get the best out of your steam unless you know what its properties and capabilities are.

You may think that you know all that is necessary for the operation of your power plant, but unless you understand the Steam Tables thoroughly you cannot be sure. Do you know whether your steam engine is operating efficiently, what its steam consumption should be, what it actually is? Do you know *all* the possibilities of using the exhaust for process purposes?

These Bulletins will help you

STEAM FOR PROCESS HEATING
(*Bulletin No.* 25)

A simple introduction to the properties of steam leading to a more critical understanding of the steam tables.

COMBINED POWER AND HEATING
(*Bulletin No.* 40)

A complete survey of the possibilities of using the exhaust steam from an engine for process purposes, or for developing power from the steam before it reaches the process. This bulletin is written in a form suitable not only for the engineer and the specialist but also for the management.

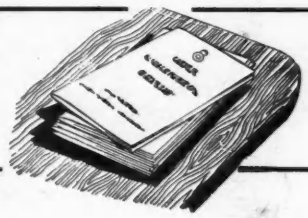
STEAM FOR POWER (*Bulletin No.* 33)

An explanation of the power-producing properties of Steam. Read No. 25 first and then this bulletin, which, among other things, explains "entropy" without advanced mathematics.

THE EFFICIENT OPERATION OF STEAM ENGINES
(*Bulletin No.* 34)

The practical side of steam engine operation: how to get the most power from the least steam. What the indicator diagram is and what it means.

Few people know how interesting steam can be until they have had to learn about it. These bulletins make the learning easy. If you haven't all the copies you require, they can be obtained free on demand from the Ministry's Regional Offices.



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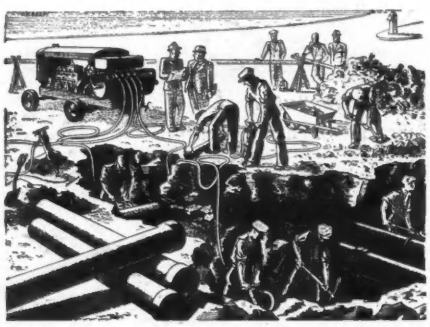

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Printed by Straker Brothers, Ltd., London, E.C.2, for Walter King, Limited, 11, Bolt Court, Fleet Street, London, E.C.4.—Wednesday, December 5, 1945.